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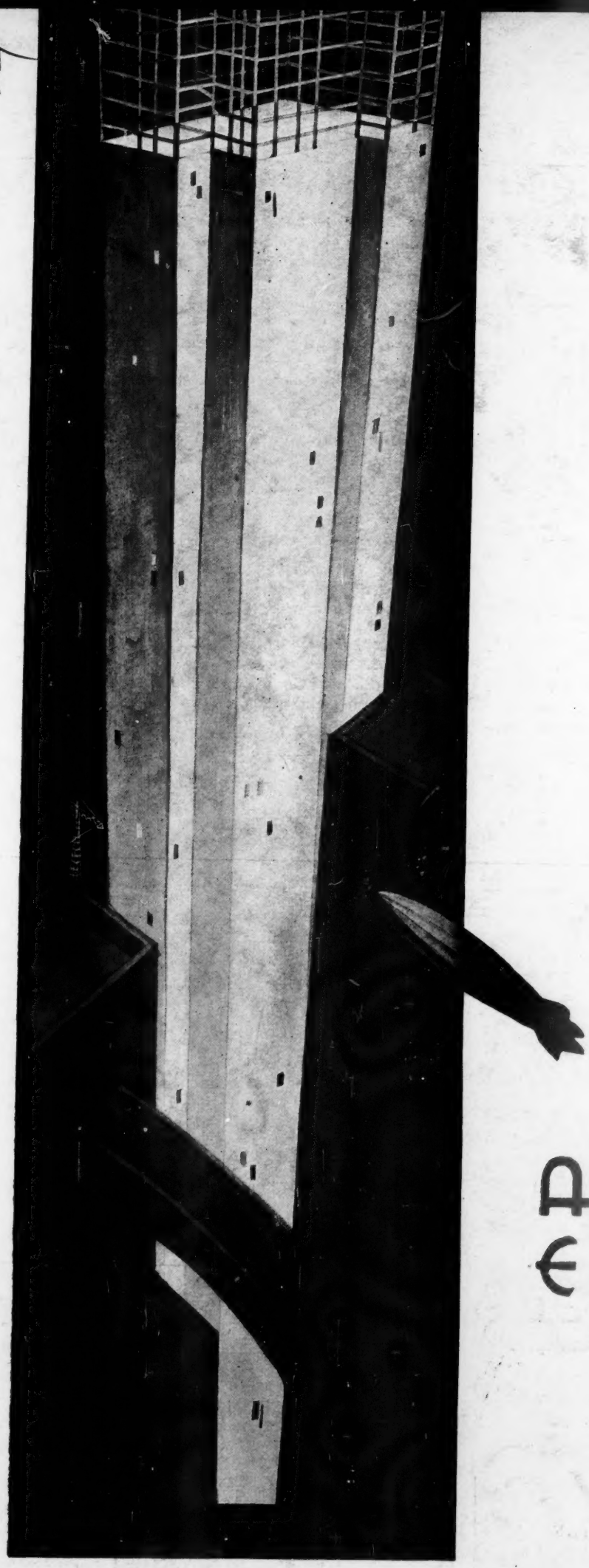

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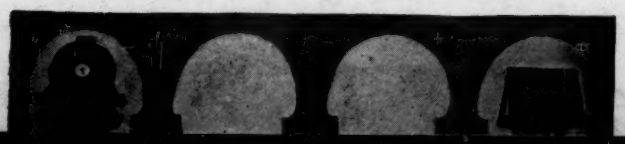

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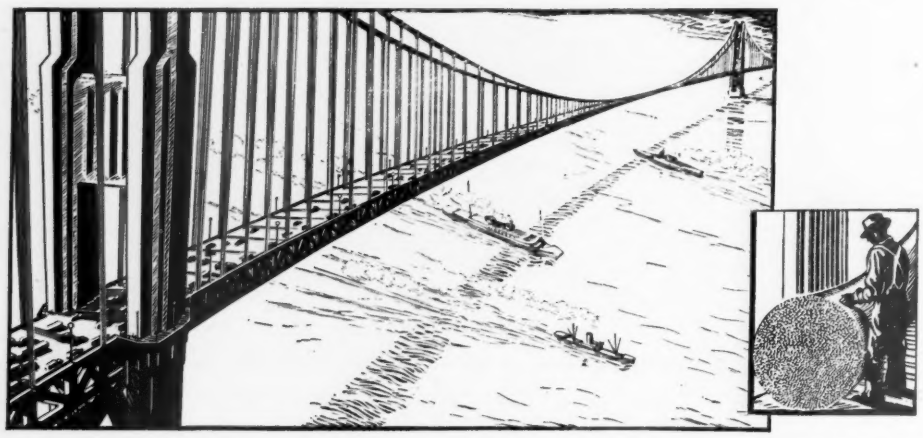

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NUMBER 6 JUNE, 1934

A HOPE FULFILLED

National Society of Professional Engineers

Conference Results in Organization

ON Friday, May 25th, representatives of six state societies and one nation-wide organization met in New York and after nearly eight hours of discussion and deliberation evolved a plan for the organization of the professional engineers of the United States. Details of the conference appear elsewhere in this issue.

The formation of a national body, representative of the profession of engineering and responsive to the opinions of its forty thousand potential members, is a sine qua non to the survival of the calling which is so largely responsible for the civilization under which society must function. Since its inception the New York State Society of Professional Engineers has envisioned the creation of a nation wide agency dedicated to the same purposes which the Society itself has so consistently and effectively promoted throughout its existence of some seven years. The necessity for such an agency has been apparent for some time, but the kaleidoscopic change in the nation's economic status so filled men with apprehension that for several years the primitive instinct of sauve qui peut directed the course of practically all Americans. While to-date the conditions have improved but little, engineers have, after the fashion of soldiers in a trench, become somewhat more accustomed to their unhappy lot of the past five years and are giving serious thought to the future. They no longer will or can isolate themselves from the conduct of a society which cannot endure without them.

During the last few years the need for a representative engineering voice in governmental councils has been most apparent. Legislation, codes, charters and other social agencies or programs of vital concern to the profession have been set up or enacted without the guidance of engineering opinion and almost invariably in such form as to prove inimical to the engineer whose well-being is inseparable from that of mankind.

One year ago the American Society of Civil Engineers held within its grasp the greatest opportunity in its history. Offering itself as a national agency for the creation of a code, other organizations withheld their programs in order that no obstacle to national solidarity and possible leadership might be presented. Despite the fine spirit which prompted those who urged the A. S. C. E. to proffer its services, the laissez faire philosophy of a passing school so dominated the decisions of the committee that the hopes for a new deal vanished. The appeals of those who pleaded for a proposal that would express the opinion of the profession as a whole were ignored, and, instead of a document setting forth the hopes and aspirations of engineers, there resulted draft after draft of a so-called code, which in almost every instance was pitiful in expression and unmindful of human needs.

These opinions are offered with a full cognizance of the restrictions set up by national authorities. It is not ignorance of the specification which limited the comprehensiveness of any code that has prompted general disapproval, but rather the refusal of the committee to visualize the necessity for a united profession, wherein those chosen as representatives would have the confidence and respect of those whose province it is to choose. A virile and unified calling without a code is far preferable to a disorganized and dissatisfied profession wherein the welfare of the vast majority of the membership would be sacrificed to the selfishness of a small minority.

Today not five per cent of the profession is even interested in the proposals, which have succeeded one another at the rate of three for every two months. The American Society of Civil Engineers has not succeeded in solidifying the profession for several reasons: first, failure to ascertain a full expression of opinion from its own membership and from the profession at large; second, failure to realize that human aspirations precede even professional hopes; and third, failure to accord a voice in its deliberations and proposals to those who were most in need of protection and help.

The proposed agency, which is to be known as the National Society of Professional Engineers, has an arduous task before it. Only unselfish zeal and professional pride will carry the hopes of its sponsors to a successful culmination. This

(*Continued on Page 16*)

RELIEF WORK

The Unemployed Engineer and Architect

By Lincoln Rogers

THE subject, "The Unemployed Engineer and Architect," is one which is close to the writer's heart. Most of the men coming within this category are highly skilled in their professions and find themselves, through no fault of their own, on relief payrolls.

The problem of caring for such persons is one which has engaged the attention of the authorities, local and national, for more than a year. As head of the City Work Bureau and as temporary head of the Civil Works Administration the writer has been in close contact with the plight of these men.

Thousands have found the city Work Bureau a bulwark of protection against the pangs of hunger and homelessness. The City Work Bureau was appealed to daily by not only the professionally indigent, but also by the self-respecting and hard-working citizens, representative of America. Confined to no one class, they numbered in their ranks laborers, craftsmen, business men, white collar workers, architects, engineers and lawyers, a cavalcade of need, moved by one common impulse, the desire to work.

Large expenditures and widespread organization were required to carry on this work. These large sums of money were difficult to procure, because the Bankers refused to extend additional credit to the City. This made the finding of sufficient finance extremely difficult and precarious. We did not know from month to month what monies we would have or indeed, if we would have any at all.

These were the conditions just prior to the creation of the Civil Works Administration, and after weeks of conferences a new program of finance was finally agreed upon, wherein the Federal Government provided one-third of the money required each month, the State one-third, and the City one-third for the purpose of carrying on Relief Work in New York City. Immediately after this program was adopted and these additional funds were made available, the City Work Bureau placed 35,000 men at work. This naturally made positions available for additional engineers and architects to carry on the various projects. Then came the pronouncement from Washington that all C. W. B. projects with their personnel, lock, stock and barrel, would be taken over by the Civil Works Administration. Under the new Recovery Administration, the Federal Government agreed to pay all wages, provided the City Administration would provide money for materials.

Automatically, with the advent of the Civil Works Administration, every Relief Worker ceased to be on a charity basis, ceased to be a mere brass tag worker and became a Government employee. Recovery was indeed at hand.

It was never intended to have the entire personnel of the City Work Bureau transferred instantly in one swoop to the C. W. A. It was planned to transfer them in groups over a period of two or three months. This would have afforded opportunity to efficiently place the professional men and the skilled and unskilled workers on productive work in an orderly way, with the appropriate plans and supervision. In this way, the physically and mentally unfit could have been left on the City Work Bureau payrolls to carry on the work which was made or "found" for them. In every community there are always the mentally and physically weak who could never, even in normal times, rise above such a fate. Had this plan been employed, the C. W. A. could have been a forward movement, for the writer believes it is un-American to have so many self-respecting, competent men and women on relief or charity payrolls. As acting Executive Head of the Civil Works Administration a work program was set up to immediately bring the total of workers up to 160,000, at a monthly cost of $14,000,000. It was planned to further increase the program to bring the total number of workers up to 175,000 within 30 days. This was in compliance with official instructions to immediately transfer all of the 113,000 C. W. B. workers and take on new workers through the National Re-employment Bureau.

This is only a brief review and it does not go into the details of the running of the C. W. A.

By this time a new political party came into control of the City Government, which caused the entire executive personnel of the new C. W. A. to be changed. This took place at a time which was most unfortunate; the critical period of the expansion of this vast organization. The wholesale appointment of new executives could not and did not help the situation. The entire organization became a whispering gallery of uncertainty and apprehension. This led to confusion and inefficiency, waste and irregularity. All of which probably influenced Washington to quickly put an end to C. W. A. and throw these men back to Welfare payrolls. And so, the C. W. A., after floundering for five months, folded up just as suddenly as it was formed and the workers were all precipitated back on charity payrolls. This can only be construed as a disastrous retreat.

The time has long since passed when the exigencies of the situation require that productive work continue along with improvised or "found" work, and by this is meant work "found" for the purpose of making a charity job.

The productive work undertaken by the C. W. A. should never have been thrown back upon charity or welfare organizations and certainly not at reduced wages.

Only the "found" or made work and the personnel capable only of being employed on such jobs should have been returned to Welfare. All the

(Continued on Page 16)

THE TULANE UNIVERSITY LIBRARY NEW ORLEANS

Do We Need Birth Control For Ideas?

No—Says Charles F. Kettering

Reprinted, with permission, from the Rotarian of April, 1934

THIS article is the negative opinion of an interesting symposium, the affirmative of which appeared in the May issue.

The proposal to declare a moratorium on mankind's inventive genius would have to come in the form of a law against thinking. And this would defeat the very object of those who seek a way out of our present difficulties by such a move.

It is not the standardization of production which constitutes the real danger of the world today, but the standardization of ideas. A new world is being built and you cannot very well standardize a half-finished product. It will just naturally change, for better or for worse. Nothing can stand still. Coherent, living thought must rule a sane world, not half-completed ideas which are temporarily checked by some man-made law.

This Machine Age did not just happen. It has been a slow evolutionary process going back over three hundred years. Copernicus, Galileo, Kepler, Newton planted the seed of it when they gave to mankind some degree of understanding of celestial mechanics, of the laws of motion. Research men, inventors, technologists took the knowledge of these universal laws into their laboratories, reduced them from the speculative to the practical, and as a result we have our present mechanically motivated civilization.

We are not at the end, but at the beginnings. We have but reached the shores of a great unexplored continent. We cannot, however, turn back, for there is no other direction to go but forward. It is man's destiny to ponder on the riddle of existence and as a by-product of that wonderment he is creating a new life on this earth.

Such a moratorium would have to be retroactive and declare null and void the researches of Thales, Aristotle, Archimedes—all the mighty host of philosophers, mathematicians, physicists, and engineers who up to now have had honored places in the story of the world progress.

To stop the evolutionary tide of our economic development would be as impossible as the historic effort of King Canute to order back the sea.

There is nothing permanent but change. The very moment that a tree reaches its full growth it is the beginning of the end. Nothing that lives can remain static, stand still. Neither can a civilization, which is merely a continuing collection of individual lives. Our composite opinion may accelerate or retard the pace but cannot stop our progress.

When this movement does slow down, when a civilization becomes static, standardized, it crumbles; then vanishes. That is the oldest lesson of history.

This modern civilization of ours, only 300 years old, began when men took from the celestial system its mechanical laws, and now we may paraphrase Shakespeare:

"The fault, dear Brutus, is not in our stars,
but in ourselves . . ."

Nobody will deny that the present problem is one of grave maladjustment. But the solution of it lies not in less research but in more research. An extraordinary thing happened in 1914 when the World War broke upon the human race. The will to win brought forth tremendous energies. Mankind's inventive genius was tremendously activated and the technique of mass production greatly accelerated. We swung so far in one direction that what should have been a normal evolutionary development became lopsided.

The statesmen and the economists are the ones who handled the actual business of war, did the financing, made the loans, and signed the treaties. The research engineers merely responded to a patriotic call of duty. Because of their energies a war was won—or lost. Now they must turn their same creative talents to readjusting the Machine, to get it back into balance.

For countless centuries man's great materialistic objective on this earth has been to devise labor saving machinery. The unknown hero who first invented the wheel was creating a labor-saving device. But because of the World War and the desperate efforts of all nations to save man power, this labor-saving urge got out of line with the logical progress of society.

Now the engineers and scientists, instead of being stopped in their work, should be encouraged to continue at fever heat to balance matters—and they will—by the invention of labor-creating systems. That is the world's greatest need now, and necessity is the mother of invention.

The inventors of the world should be chided for not doing enough inventing instead of doing too much. There has not been an invention of any importance in the past ten years.

It is easy for the economist and the politician to blame the inventor and the research engineer. How frequently the thoughtless members of the family blame the doctor when someone is sick. Shall we abolish the doctor because someone takes an overdose of medicine? As a matter of plain, cold fact the scientist, the technologist, does nothing but reveal and make usable the natural laws.

That first mathematician who gave to mankind

(*Continued on page 17*)

A Request From Abroad

International Association for Bridge and Structural Engineering

Plans Congress in Rome with Faciste Agency

BEARING date of May 23rd, the following communication and report, from Zurich, Switzerland, are printed in compliance with the courteous request of transmittal. It is interesting to note the association of engineering with the influence of one of the great social movements of the times.

INTERNATIONAL ASSOCIATION FOR BRIDGE AND STRUCTURAL ENGINEERING

Zurich, May 23rd 1934.

To the Editor,
"The American Engineer,"
Grand Central Terminal Building,
New York City, U. S. A.
Dear Sir,

We have the honour to forward you enclosed a short report on the 6th Meeting of the Permanent Committee of the International Association for Bridge and Structural Engineering, held at Stresa in April, 1934. We should be greatly obliged if you could see your way to publishing this report in one of the next numbers of your journal.

Thanking you heartily in advance, we remain, dear Sir,

Yours faithfully,
International Association for Bridge and Structural Engineering
The Secretary:

This year's session of the Permanent Committee of the International Association for Bridge and Structural Engineering was held at Stresa, the President of the Association, Prof. A. Rohn (Zurich), being in the chair. The meeting brought together 40 delegates from 12 countries. It is good to be able to state that the number of members of the Association is always increasing, in spite of the all-prevailing industrial crisis. At present the Association has, in round figures, 1500 individual and collective members, representing a total of 46 countries.

Besides attending to current business of the Association, the session at Stresa was occupied with the questions concerning preparing for and carrying through the next Congress for bridge and structural engineering, which it is intended to hold in Rome in spring 1936. Similarly as at the Paris Congress in 1932, previously prepared papers on themes in connection with structural steel and reinforced concrete work will be dealt with or discussed, each in 3 half days. One theme concerns questions of interest to both methods of building. It is also intended, in addition to the chosen themes, to allow papers on optional themes. (For this 2 half days are reserved).

A considerable part of the discussions at Stresa was devoted to deciding on the technical and scientific themes for the Congress. For steel structural work, the subject chosen for the first theme was the importance of the toughness of steel in calculating and dimensioning steel structures. A half day is devoted to practical questions in connection with welded steel work. Particular consideration will be paid to questions touching on the practical designing and execution of welded structures. The influence of dynamic loading, questions regarding inspection of welded joints, and also precautions to be taken by the designer in order to minimize the changes of shape caused by heat stresses, etc., are to be discussed in conjunction with this theme. Finally, it was decided that the third question in connection with steel work should be the theory and experimental research on details of structural steel work, for both riveted and welded structures.

The list of themes for reinforced concrete comprises in the first place the question of stresses and factors of safety in reinforced concrete structures, in which the point of view of the designer will be particularly considered. The influence of continuous and repeated loading, means for increasing the tensile strength and for reducing cracking of the concrete, the adoption of high-grade steels, etc., are subordinate themes for this question. A second theme will deal with recent ideas concerning calculating and designing reinforced concrete structures, in which flat supporting structures, (halls, cupolas, silos, etc., and other types of large structures such as wide-span bridges, etc.) will be particularly considered. Papers on the adoption of concrete and reinforced concrete for hydraulic structures (dams, pipe lines, galleries under pressure, reservoirs, etc.) will fill the third day of discussion for reinforced concrete work. Of interest to both constructional methods is the question of research on building ground, which will be discussed particularly thoroughly at the Rome Congress.

The definite programme of the themes, with detailed explanations concerning them, will be made known to the members of the Association in the second number of the "Bulletin" appearing in June.

The books just published, namely the "Final Report" of the Paris Congress and the 2nd volume of the "Publications" issued by the International Association were submitted finished at the session at Stresa.

At the suggestion of the Italian Vice-President of the Association, the Permanent Committee drew up an application, addressed to the President of the Council of Ministers of the Kingdom of Italy, requesting that the next Congress be held in Rome in 1936 under the collaboration of the Fascist Italian Syndicate of Engineers and the European Union of Engineering Associations in Rome.

During the session at Stresa, the members attended several receptions and made excursions and visits to places of interest. The arrangements for

(*Continued on Page 19*)

Dipping Into The Future

F. Alexander Magoun

Reprinted with permission from "The Tech Engineering News," June, 1934

PHILOSOPHISING upon the future, Professor Magoun of Massachusetts Institute of Technology suggests a pleasant world is in store for the generations to come, but carefully and wisely avoids positive predictions.

"A bare quarter of a century after Torricelli had invented the barometer, and in consequence shown that the atmosphere exerts pressure, a Jesuit named Francesco de Lana (1631-1687) designed a vacuum balloon, or more strictly a set of four, each one fastened to a corner of a light wicker car. It was more than a century later that from Annonay, France, the brothers Montgolfiere sent up the first successful balloon.

It is not important for our purpose that de Lana failed to figure that the atmospheric pressure on his 20-foot spheres would total almost 2,750,000 pounds, but his philosophical reflections are significant. Said he: "God would not suffer such an invention to take effect, by reason of the disturbance it would cause to the civil government of men. For who sees not that no City can be secure against attack, since our Ship may at any time be placed directly over it, and descending down may discharge Soldiers; that the same it would happen to private Houses, and Ships on the Sea: for our Ship decending out of the air to the Sails of Sea-Ships . . . . it may overset them, kill their men, burn their Ships by artificial Fireworks and Fire-balls. And this they may do not only to ships but to great Buildings, Castles, Cities, with such security that they which cast these things down from a height out of Gun-shot, cannot on the other side be offended by those from below."

This unmistakable prediction of military aircraft was made in the 1670's, thus anticipating by almost two hundred years both the definite proposal of John Wise in 1846 that balloons be used to drop bombs on Vera Cruz and the actual use of military balloons in the Civil War.

Instances of such keen, long-range prognostication are rare. Yet even the most unimaginative of us occasionally lets his frolic fancy leap the waddling years and venture a dip into the future. Truth comes by a process best described as groping, but the poet and the dreamer occasionally see far horizons illuminated as with a lightning flash.

What then, of the next hundred years?

To predict such things as television, long range weather forecasting, luminous paint, or black light is not to make the leap at all. These we already have with us to some degree. It were bolder to play with the possibility of synthetic food cunningly compounded in the factory by means of incredibly cheap atomic energy. Or, if you would become a follower of de Lana, to venture the opinion that in the glowing 2050's, astration—flight to the stars as distinguished from our own earthbound aviation—will have progressed sufficiently for men to be heroically dying in fruitless attempts to reach the moon a scarce 250,000 miles away.

Only by such extrapolating of existing curves can we hope to achieve intelligent prophesies. One such extrapolation would be the prediction of a rapidly growing international language; not after the manner of Esperanto, which was born full grown, but rather by an evolutionary process such as followed the Battle of Hastings. The Norman Conquest superposed another language on the defeated Saxons; out of this union issued that hopelessly illogical tongue now known as English.

In suggesting the imminent unification of linguistics I refer, of course, to the influence of the radio which leaps mountains, fortresses, or customs barriers with such blithe unconcern that an exchange of words, gradually levelling differences, is found to make appreciable strides toward a one-language Europe over so long a period as a hundred years. How appropriate that the classic role played by the Tower of Babel in the confusion of tongues should find a modern counterpart in a pair of towers, this time achieving the unification of dialects through the medium of copper wires uniting the towers!

But to return to the field of science—by the twenty-first century bio-chemistry will have come into its own with incredibly important results. Laziness, either physical or mental, will have gotten beyond the stage of our witchdoctor, curtain-lecture treatments to the dignified position of a functional mal-condition easily corrected through the stimulation of some gland.

The equivalent of a galvanometer will be available for measuring personal magnetism with the same objective certainty now identified with height or weight.

It is no prophecy at all, but merely the obvious application of Darwinian principles to predict the extinction of the homely girl as a result of selective breeding. This, however, is no cause for envying your great-great-grandson. The uncomely damsel has been undergoing extinction for centuries. As the homely girl becomes personable, the pretty girl becomes even more beautiful. Result: the standard of pulchritude goes up and there are still odious comparisons.

In another hundred years democracy, as we know it, will be a relic. As a form of government it came into being in rural England; jumped the Channel to France; was brought to America by the Huguenots. In farming communities where everyone has been personally acquainted for generations with the candidate for selectman; where everyone has a competent opinion as to the need of the school-house for a new coat of red-lead or as to the

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An Eternal Problem

To Convince Skeptics

As Difficult in the 14th As in the 20th Century

Filippo Brunelleschi—1377-1446

From Biography by Giorgio Vasari—1511-1571

An interesting biography of one of the world's truly great creative architects and engineers is that of the famed Brunelleschi by Giorgio Vasari, who lived about a half century after his subject.

The translation by Mr. Jonathan Foster of England was made in 1850. Both the author and the translator manifest qualities of scholarship worth commending for public reading. The following excerpts are offered as an example of the same:

"But consider, gentlemen, that it is not possible to raise the Cupola in any other manner than this of mine, and although you laugh at me, yet you will be obliged to admit (if you do not mean to be obstinate), that it neither must nor can be done in any other manner: and if it be erected after the method that I propose, it must be turned in the manner of the pointed arch and must be double—the one vaulting within, the other without, in such sort that a passage should be formed between the two. At the angles of the eight walls, the building must be strengthened by the dovetailing of the stones, and in like manner the walls themselves must be girt around by strong beams of oak. We must also provide for the lights, the staircases, and the conduits by which the rain-water may be carried off. And none of you have remembered that we must prepare supports within, for the execution of the mosaics, with many other difficult arrangements; but I, who see the Cupola raised, I have reflected on all these things, and I know that there is no other mode of accomplishing them, than that of which I have spoken." Becoming heated as he proceeded, the more Filippo sought to make his views clear to his hearers, that they might comprehend and agree with him, the more he awakened their doubts, and the less they confided in him, so that, instead of giving him their faith, they held him to be a fool and a babbler. Whereupon being more than once dismissed, and finally refusing to go, they caused him to be carried forcibly from the audience by the servants of the place, considering him to be altogether mad. This contemptuous treatment caused Filippo at a later period to say, that he dared not at that time pass through any part of the city, lest someone should say, "See, there goes that fool!" The Syndics and others forming the assembly remained confounded, first, by the difficult methods proposed by the other masters, and next by that of Filippo, which seemed to them stark nonsense. He appeared to them to render the enterprise impossible by his two propositions—first, by that of making the Cupola double, whereby the great weight to be sustained would be rendered atlogether unmanageable, and next by the proposal of building without a framework. Filippo, on the other hand, who had spent so many years in close study to prepare himself for this work, knew not what course to betake himself, and was many times on the point of leaving Florence. Still, if he desired to conquer, it was necessary to arm himself with patience, and he had seen enough to know that the heads of that city seldom remained long fixed to one resolution. He might easily have shown them a small model which he had secretly made, but he would not do so, knowing the imperfect intelligence of the Syndics, the envy of the artists, and the instability of the citizens, who favoured now one and now another, as each chanced to please them. And I do not wonder at this, because everyone in Florence professes to know as much of these matters, as do the most experienced masters, although there are very few who really understand them; a truth which we may be permitted to affirm without offence to those who are well informed on the subject. What Filippo therefore could not effect before the tribunal, he began to attempt with individuals, and talking apart now with a Syndic, now with a Warden, and again with different citizens, showing moreover certain parts of his design; he thus brought them at length to resolve on confiding the conduct of this work, either to him or to one of the foreign architects. Hereupon, the Syndics, the Wardens, and the citizens, selected to be judges in the matter, having regained courage, gathered together once again, and the architects disputed respecting the matter before them; but all were put down and vanquished on sufficient grounds by Filippo, and here it is said that the dispute of the egg arose, in the manner following. The other architects desired that Filippo should explain his purpose minutely, and show his model as they had shown theirs. This he would not do, but proposed to all the masters, foreigners and compatriots, that he who could make an egg stand upright on a piece of smooth marble, should be appointed to build the Cupola, since in doing that, his genius would be made manifest. They took an egg accordingly, and all those masters did their best to make it stand upright, but none discovered the method of doing so. Wherefore, Filippo, being told that he might make it stand himself, took it daintily into his hand, gave the end of it a blow on the plane of the marble, and made it stand upright. Beholding this, the artists loudly protested, exclaiming, that they could all have done the same; but Filippo replied, laughing, that they might also know how to construct the Cupola, if they had seen the model and design. It was thus at length

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THE TULANE UNIVERSITY LIBRARY NEW ORLEANS

Conference Of Organizations Of Professional Engineers

New York, N. Y., May 25, 1934

Minutes by Gerald W. Knight

Representatives from the New York State Society of Professional Engineers, the New Jersey Association of Professional Engineers and Land Surveyors, the Pennsylvania Society of Professional Engineers, the Connecticut Society of Engineers, the South Carolina Society of Professional Engineers, and the American Association of Engineers, met at 2 P. M., in Room 1943, Grand Central Terminal Building.

Those present at the afternoon and evening session included the following:

Dr. D. B. Steinman, Arthur V. Sheridan, Arnold G. Chapman, Donal L. Chamberlain, Col. Hugh A. Kelly, Morris Goodkind, George H. F. Randolph, Victor Gelineau, R. M. Boynton, Myron Hendee, T. Keith Legare, Louis P. Booz, G. Russell Hartley, Charles Gilman, Peter F. Daly, Claire E. Tilton, W. A. Stubbs, R. J. Van Wagner, John Chas. Riedel, Adm. Frederick R. Harris, L. A. Keast, Willard S. Conlon, John L. Hodges, C. George Krueger, A. F. Angelicola, John W. Davis, Gerald W. Knight.

An Agenda setting forth the major considerations of national unification of existing professional engineers society units and the formation of new groups in states where no units exist was distributed among those present.

For purposes of organization, Dr. D. B. Steinman, of New York, then was designated and acted as temporary Chairman. Mr. W. A. Stubbs was then designated and acted as temporary secretary.

The Chairman then called upon Mr. Arthur V. Sheridan and Mr. R. M. Boynton to state the purposes of the Conference, and in general, to outline the proposed objectives of a national organization.

To their clear and convincing pleas for organized national unity, Mr. Donal Chamberlain, President of the American Association of Engineers, proposed a complete cooperation of the A. A. E. in joining such a new national organization, and to that end agreed, with the prior consent of that organization's executive board, that if his offer was accepted and the new national organization became successfully launched, to subordinate or merge the A. A. E. personnel and all its activities to the new and larger national unit.

On discussion from the floor on this offer, it was brought out that the A. A. E. had approximately 1600 members which that organization desired only to hold for transfer to the new organization, and that, the present officers would be glad to surrender their official positions without reservation, to a new national official personnel, if, by so doing, it would assist and expedite the formation of a new national organization.

This generous offer then led to the consideration by the Conference of the following major questions:

1. Do we favor the establishment of one national organization to unite, coordinate and extend the activities of the State Societies of Professional Engineers?
2. Shall we accept the proposal that the American Association of Engineers join in forming such National Society of Professional Engineers, with such changes in name, constitution, program and organization as may be decided upon?
3. Shall we invite all national and state organizations to join in forming a national body?

These questions were taken up consecutively, and in discussions led by president Arnold Chapman, of the New York Society, Admiral Frederick R. Harris, Mr. Morris Goodkind, Mr. Arthur V. Sheridan, Dr. D. B. Steinman, Mr. Victor Gelineau, Col. Hugh A. Kelly, Mr. T. K. Legare, and Mr. Gerald Knight, many of which involved the policies and principles of long established society units, it became perfectly clear that while these fundamental questions would be affirmatively answered, many collateral problems of only slightly lesser importance would find less easy solutions. It was further seen that this conference would have to write the specifications for a new order of things and for an entirely new organization.

With the time element thus become a factor, Dr. Steinman appealed for devotion on the part of the conferees to the national purpose, and for such speed in the deliberations as would permit of reasonable completeness in establishing a definitely desirable program.

The votes upon the three questions were affirmative and unanimous.

To the question of,—a name for the national organization, after considerable discussion, it was decided to call it—National Society of Professional Engineers.

To the question of,—"Shall full membership in the national organization be restricted to Professional Engineers registered in any state, or certified by the National Bureau of Engineering Registration?"—the vote was affirmative and unanimous.

To the question of,—"Shall the National Society consider provisions for men not yet registered as Professional Engineers," the vote was affirmative. The original question, amplified to include students, juniors and affiliates, provided grounds for lengthy debate, and it was decided to leave further consideration of this important matter to an appointed committee, representing existing state societies. To this decision there was no dissenting voice, and

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Annual Meeting

New York State Society of Professional Engineers

New York, May 26th, 1934

THE Seventh Annual Meeting of the New York State Society was held on Saturday, May 26th, at the Hotel Commodore, New York.

Approximately three hundred members, from all parts of the State, were in attendance. Fourteen Chapters were represented by their Presidents. In addition, the Society had as observers and guests, Mr. Donal L. Chamberlain, of Washington, President of the American Association of Engineers, and T. Keith Legare, President of the South Carolina Society of Professional Engineers and Secretary of the National Council of State Boards of Engineering Examiners.

While copies of the minutes have been forwarded to the various Chapters, which, as President Chapman noted in his annual report, now embrace forty-four counties, comprising approximately 95% of the population and nearly 90% of the area of the State, a summary of the meeting appears justified.

The reports of the Financial Secretary, Mr. Ernest F. Fox, and the Treasurer, Mr. P. M. Corry, indicate that, despite the prevailing conditions, the Society is in a most healthy state. Notwithstanding the loss of a considerable number, who, for financial reasons, were unable to continue their membership, a net gain of more than two hundred members was recorded during the year. Niagara, Broome and Warren and Washington have been added to the Chapter roster within the last twelve months. Chairman Fred H. Zurmuhlen of the Membership Committee will, like Alexander of old, shortly be compelled to sigh for new worlds to conquer. The State is almost completely organized, so far as Chapters are possible.

An interesting sidelight on the activities of the Society was the reading of news items taken from the American Press of London and Paris and referring to the campaign to protect and dignify the term engineer in this state.

The Code was, as usual, the subject of much discussion. After voting to disapprove the proposals now in the hands of the authorities in Washington, the meeting registered a decisive negative to the the question of whether engineers should be coded in any manner. The Society cannot now consistently advocate or endorse any proposals to code engineers. In the opinion of the gathering the engineer is legally a professional man and as such is equally without the province of code regulation as is the lawyer or doctor.

The developments in the move to form a National Society of Professional Engineers were outlined by Dr. D. B. Steinman. After much discussion, a decision to actively participate in the formation of the new organization was unanimously made. As suggestions to the committees entrusted with the task of preparing the framework of the national organization, resolutions bearing on the established policies of the New York State Society were adopted. These resolutions called for the recognition of the State Society as an individual entity in a confederation of such organizations and for the restriction of membership to licensed professional engineers.

A strong plea was made by Mr. A. E. Roche, Chairman of the special committee on the "Reorganization of County and Municipal Governmental Agencies," in which he urged engineers to study and take an active interest in government, not alone as practitioners, but also as citizens.

A proposed charter skeleton for the City of New York was reported as in progress. The importance of prompt action was indicated by reference to the activities of the committee recently created by legislative enactment and headed by the Hon. Alfred E. Smith.

Among the other resolutions adopted were:

An appeal to the T. E. R. A. for the maintenance of salary scales (at least equal to those in use by the C. W. A.)

A protest against the provision for salaries less than that paid to common labor, which had been set up for professional engineers of very high qualifications in connection with a Sanitation Project in New York.

An appeal for the appropriation of funds for the Mapping Program of the U. S. Coast and Geodetic Survey Corps.

A disapproval of any proposal to identify the New York State Society with any but licensed professional engineers.

An appeal for the appointment of engineers to executive places in departments entrusted with the construction and administration of engineering projects.

A decision committing the Society to the support of legislation making mandatory the use of the Torrens Law (which provides for the registration and guarantee of property titles by the State).

An appeal for the appointment of engineers on sub-committees dealing with the revision of the Charter of the City of New York.

A proposal calling on the authorities to comply with the law in the selection of engineering personnel to direct relief projects entailing professional services.

A request for the speedy allotment of P. W. A. funds for work in New York, together with an approval of U. S. Senator Wagner's measures and efforts in behalf of public works.

The following Officers and Directors were elected for the ensuing year: Arnold G. Chapman (Albany), President; Frederic R. Harris (New York), Vice-President; John C. Riedel (Kings), 2nd Vice-President; Ernest F. Fox, (Bronx), Financial Secretary; Patrick M. Corry (Bronx), Treasurer;

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CHAPTER NEWS

Raphael J. Smyth, Chairman
Committee on Chapter Activities

CHAPTERS are urged to forward material intended for publication on or before the first day of each month.

CHAUTAUQUA-CATTARAUGUS COUNTIES

That thriving young Chapter of Chautauqua and Cattaraugus Counties held its May meeting on the 9th of that month in the Y. M. C. A. building in Jamestown. The president of the Chapter, Mr. Walter F. Shaw of Jamestown, whose enthusiastic and effective leadership is attracting favorable attention, presided at the meeting.

The Chapter is alert and active in investigating reported violations of the licensing law of this State. It has gathered and submitted data to the State Education Department concerning 3 violations of law in the two counties in which it has organized jurisdiction. It would be wise for violators in these counties to mend their ways for the Chapter is sure to get them "if they don't watch out."

Steps are being taken to have city and village officials in the counties informed of the provisions of the licensing law as it appears that many are unaware of its existence as it applies to city and village Engineers. And when "ignorance of the law" cannot be pleaded, observance will be expected and urged with such insistence as may be necessary.

A little more than a year ago—on May 10th, 1933, to be exact—eight Engineers of this area foregathered with the go-getting organizer, Mr. Fred H. Zurmuhlen of Richmond, at the Hotel Jamestown to discuss the formation of a Chapter. The present Chapter was organized and its membership has expanded from eight to twenty-one. The record shows that 100% of its dues to the New York State Society have been paid. And it is reported that the Chapter which had the largest percentage attendance at the annual meeting of the State Society on May 26th in New York City was the Chautauqua-Cattaraugus Chapter. A glance at the map of New York State will show that the geographical center of these two counties is farther west than that of any county in the State. The long distance, the discomfort and the expense of the great journey from the westernmost to the easternmost parts of the Empire State were severe handicaps to overcome in a race for supremacy in a manifestation of interest in the work of the State Society. This young, small Chapter—farthest from the goal of the council-hall—won that race and is deserving of a chaplet of victory made of laurel leaves of congratulations from every Chapter in the State.

A complimentary salute of 21 guns to the 21 members of Chautauqua-Cattaraugus Chapter! And two more to those captains of energy and enterprise—President Walter F. Shaw and Secretary R. B. Lyon!

N. B.—The Chapter meets on the 2nd Wednesday of each month (except during July and August) and extends a cordial invitation to all members of the Society to "go West" and participate. A rousing welcome awaits all visiting members.

DUTCHESS COUNTY

The regular Spring Meeting of the Dutchess County Chapter was held in the Y. M. C. A. building, Poughkeepsie, on April 27th. Thirty-one members and guests were present at the meeting over which Mr. W. A. Schuerman, President of the Chapter, presided.

Dr. D. B. Steinman, past president of the New York State Society, discussed "The Economic Status of the Engineer." During the course of his highly informative discussion Dr. Steinman urged the establishment of an engineering counsel of professional development which would function in the selection of the youth for engineering training, his education in high school and college, his period of actual work in the profession and finally his admission to the body of full-fledged professional Engineers.

The meeting was also addressed by Mr. J. H. Chubb, representing the Penn-Dixie Cement Corporation, on the subject of "High-Early-Strength with Standard Cement." Mr. Chubb illustrated his address with motion pictures and slides.

At this meeting there were elected to membership: Mr. Selden H. Hall and Mr. Sperry H. Glenn, both of Poughkeepsie and Mr. Frederick W. Terhune of Pleasant Valley.

The matter in the foregoing report was received through the courtesy of Mr. Frederick C. Fox, Jr., Secretary of the Chapter and Mr. Mark A. Golrick, Jr., Chairman of the Publicity Committee of the Chapter.

ERIE COUNTY

The Erie County Chapter held a special meeting on May 28th at the University Club, in Buffalo at which Mr. C. R. Waters, President of the Chapter, presided.

The following officers and directors were elected: President, Mr. Timothy N. McCormick; Vice-President, Mr. Stewart S. Neff; Financial Secretary, Mr. Thomas L. Mayer; Treasurer, Mr. Arthur B. Weaver; Directors: Mr. Elias H. Anderson and Mr. Herman L. Cooke, for 1 year; Mr. Leigh I. Loomis and Mr. Henry B. Sullivan, for 2 years; Mr. George F. Butler and Mr. George J. Rennie, for 3 years. The Executive Secretary will be chosen by the officers and directors.

Addresses were delivered by: Mr. W. N. (Zack) Taylor, Secretary of the Buffalo Planning Board,

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ITEMS OF INTEREST

News, Reports, Comments

And Court Decisions of Note

FOURTH INTERNATIONAL CONGRESS FOR APPLIED MECHANICS

Cambridge, England, July 3 to 9, 1934

In accordance with the resolution adopted at Stockholm in 1930, the Fourth International Congress for Applied Mechanics will be held in Cambridge, England, July 3 to 9, 1934. An English organizing committee has been formed and advises that the universities and colleges will be pleased to welcome the Congress. The subjects to be discussed will be grouped under the four general headings:

1. Rational Mechanics, including vibrations of structures and machines.

2. Mechanics of Fluids, including turbulence, the boundary layer, heat transfer, and compressible fluids.

3. Materials, including elasticity, plasticity, fatigue, and crystal structure.

4. Water Waves, including resistance and stability of ships and seaplanes.

It is realized that topics not included in the list may fall within the province of the Congress, but it is believed to cover the range in which valuable discussion is likely to arise.

The Applied Mechanics Division of The American Society of Mechanical Engineers is cooperating with the committee with the idea of coordinating the participation of other American groups in this Congress. Inquiries regarding the Congress and promises of manuscripts should be addressed to the Applied Mechanics Division of the A. S. M. E., 29 West Thirty-ninth Street, New York, N. Y. Those intending to participate are invited to intimate as soon as possible the general nature of their manuscripts. Summaries about 300 words in length, written in English, German, French, or Italian, will be required about April 1, 1934.

The committee states that unless there is a general expressed desire, backed by financial guarantees, for publication in complete form, it is proposed to publish only the mentioned summaries, together with an abstract of the discussions. It is therefore hoped that authors will include in their summaries a list of appropriate references. As in the past, summaries will be printed and distributed before the Congress begins. The reason for making this proposal is that the number of papers has risen in successive congresses so rapidly that the cost of printing them in full would make the price of the Proceedings so high that most members would be unable to buy them. While recognizing the great value of the Proceedings already published, it is believed that, even if there were no increase in cost, it would not be possible in the present financial position of the world to justify so large an expenditure on volumes containing papers the substance of which will, in most cases, appear elsewhere.

It may be possible to print in full the lectures. These lectures in the past have provided valuable reviews of the existing state of knowledge, and, as such, might fittingly appear in full in one volume, together with the summaries.

A fee of 15 shillings will be payable by all those taking part in the scientific or social activities of the Congress. All those who intimate their intention of attending the Congress will receive, early in 1934, a further notice giving details of the arrangements.

THE ENGINEERS SPEAK

N. Y. World Telegram
April 20th, 1934

What would America be like if run by engineers?

They invent mechanical progress and direct it. They bedeck the nation with power lines like a Christmas tree. They have devised the hundred-mile-per-hour railroad trains. They calculate the data of high finance. In a word, they invent and manufacture the mode of life. The public at large, in regard to all the mystery of the new science of mechanics, is like the average person who drives an automobile year in and year out without being able to do much more than inflate a punctured tire.

What, then, would America be like if run by engineers?

At Columbia University is a commission on economic reconstruction which has just made an answer, with the aid of ninety-one prominent engineers questionnaired.

The engineers in regulating the nation economically would adopt the same direct attitude they would take toward regulating an automobile which missed fire. They advise that national income be equitably distributed and that the industries be set going at full speed.

They maintain that the country has prodigious means and materials for producing an unexampled well-being, without a demand for the full output. The lack of this demand was declared to lie in the "existence of interfering institutions or the absence of essential institutions, in the functioning of the processes whereby total income flows out to the community and is transformed into purchasing power."

So speak the engineering garage men as they look over the economic car Uncle Sam is riding in.

COURT UPHOLDS CITY SURVEYOR

City Has Right to Designate

An interesting decision, which lack of space prevented publishing in the May issue, is herewith reproduced.

The New York Law Journal, Friday, March 16, 1934, p. 1275.
By Mr. Justice Miller

People ex rel. Oltarsh v. Levy, &c.—This is an application for peremptory order of mandamus to compel defendant, the President of the Borough of Manhattan, to accept for filing a vault survey made by petitioner.

The petitioner is not a city surveyor. He is a land surveyor of the State of New York, licensed to practice pursuant to article 55 of the Education Law. A vault survey, prepared and presented for filing by petitioner, has been rejected by defendant. Rejection was made on the ground that an ordinance requires such a survey to be prepared by a city surveyor (Code of Ordinances, ch. 23, art. 17, sec. 240, subdiv. 5), who must be appointed to that office in accordance with chapter 2, article 10, of the Code of Ordinances.

Article 55 of the Education Law provides for the licensing of professional land surveyors by the state. It prohibits any unlicensed person (with some exceptions that are not important here) from engaging in the practice of land surveying. This statute is general in its application. Since ordinances must yield if they conflict with a state statute, it becomes necessary to determine whether the ordinances cited are inconsistent with article 55 of the Education Law.

The office of city surveyor is an ancient one. As early as 1691 statutory authority to appoint these surveyors was granted to the municipality (Laws of 1691, ch. 18). That power has been continued or renewed from time to time. At present authority to appoint city surveyors exists by reason of chapter 2, article 10, of the Code of Ordinances. That article provides for a board to examine the competency and fitness of candidates for that office. The examining board is required to certify a list of qualified applicants to the board of aldermen. City surveyors may be appointed by the board of aldermen only from that list. Appointees must take an oath to perform "well and truly" the work required of them. It is also provided (ch. 23, art. 17, sec. 240, subdiv. 5) that applicants, for permits to construct new vaults or to maintain old ones, shall present a survey made and certified by a city surveyor. These ordinances are not in conflict with article 55 of the Education Law. A person desiring to practice land surveying within the City of New York must be

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EXAMINATIONS FOR LICENSES

New York State

Jan. 29th — Feb. 1st

FOR PROFESSIONAL ENGINEERS

Part I
MATHEMATICS

Monday, January 29, 1934—9:15 a. m. to 12:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 What is the relation between the altitude of the maximum cone that can be inscribed in a sphere of radius r and the radius of the sphere?

2 A man borrows $5254 at 4½% interest, compounded annually. How much must he pay in equal annual instalments in order that the whole debt may be discharged in 12 years?

3 At $2 per linear yard, find the cost of building a wall around a cemetery that is in the shape of a regular hexagon and contains 16,627.84 square yards.

4 Find an angle not greater than 90° that satisfies the following equation: $\cos^2 x + 2 \sin^2 x - {}^5/_2 \sin x = 0$

5 Find the distance between the two parallel lines, $y = 5x - 7$ and $y = 5x + 3$.

6 Solve for x the following equation: $a^x = b^{2x}c^5$.

7 Find the length of the arc of the semicubical parabola $ay^2 = x^3$ between the points (O,O) and (x,y).

8 Find the equation of the straight lines touching the circle $x^2 + y^2 = 232$ at the points whose abscissa is 14.

9 A lighthouse 54 feet high is built upon a rock. From the top of the lighthouse, the angle of depression of a boat is 19° 10′, and from its base, the angle of depression of the boat is 12° 22′. Find the height of the rock on which the lighthouse stands.

10 At 60 cents a square foot, find the expense of polishing the curved surface of a marble column in the shape of the frustum of a right circular cone whose slant height is 12 feet and the radii of whose bases are 3½ feet and 2 1/3 feet.

11 A tangent to the parabola $y^2 = 20x$ makes an angle of 45° with the axis of x. Determine the point of contact.

12 Two houses, A and B, are 1728 feet apart. Find the distance from A of a third house, C, if angle BAC equals 47° 51′ and angle ABC equals 57° 23′.

Part I
APPLIED SCIENCES

Monday, January 29, 1934—1:15 to 4:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 A hydraulic jack has a ram 12 inches in diameter. Its source of pressure is a single-acting hand pump with a piston one inch in diameter attached to a lever 3 inches from the fulcrum. If a force of 200 pounds is applied to the lever 3 feet from the fulcrum, how much load can be lifted by the jack? If the lever is stroked 20 times a minute through a distance of 2 feet, how long will it take to raise the load 5 inches?

2 Give the chemical equations showing the burning of limestone, the slaking of quicklime and the setting of lime mortar.

3 It takes 7.5 volts to charge a storage battery at 20-ampere rate. How much resistance must be used when charging 10 storage batteries at this rate from a 120-volt direct-current line? Draw a diagram of the circuit.

4 A stick of timber weighing 1000 pounds is resting on a plane inclined 30° with the horizontal. Assuming a coefficient of friction of 0.2, find what force parallel to the plane is required to keep the timber from sliding down. What force parallel to the plane is required to drag the timber up the plane?

5 Define or explain *five* of the following terms: hydraulic radius, velocity head, weir, Kutter's formula, Venturi meter, penstock, hydraulic gradient, hydrostatic pressure.

6 Discuss the geologic conditions that influence the nature and the degree of hardness of water.

7 At 5 cents a kilowatt hour, what will be the cost of the current required to raise 10,000 gallons of water 50 feet if 35% of the head is lost in friction in the pipe, the pump is 70% efficient and the motor is 80% efficient.

8 A gravity concrete dam, rectangular in cross section, is 20 feet wide and 40 feet high. The dam is topped by 5 feet of water and is subject to hydrostatic uplift, full value at the heel and diminishing uniformly to zero at the toe. Will the dam overturn? Give complete computations.

9 A ball is thrown with a velocity of 45 feet per second at an angle of elevation of 60°. To what vertical height will it rise? How far away from the thrower will the ball land if he stands on level ground?

10 An automobile with center of gravity 3 feet from the ground has a wheel tread of 5 feet. At what speed in miles per hour may this automobile take a curve of 50-foot radius without over-turning?

11 How many pounds of boiling water are required to melt 10 pounds of ice at 32° F. and raise the water to 70°F.?

12 What range of motion must be provided for at the expansion end of a 300-foot steel bridge if the temperature is expected to vary between 110° F. and—10° F.?

Part I
MATERIALS OF CONSTRUCTION

Tuesday, January 30, 1934—9:15 a. m. to 12:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 A square bar of wrought iron, 1½ inches in thickness, is bent into a circular arc whose radius is 200 feet, the plane of bending being parallel to the side of the square. Find the greatest normal stress in any outer fiber.

2 You are asked to pass on the suitability of several samples of sand for use in making concrete. State on what observations and tests you would base your judgment. Assume that you have facilities for making simple laboratory tests.

3 A column with an unsupported length of 20 feet carries a centrally applied load of 210,000 pounds and an eccentric load of 40,000 pounds applied at a distance of 24 inches from the center line. What is the size of column required?

4 Discuss the effect produced in the finished product by the presence of *each* of the following elements in the composition of steel: (*a*) carbon, (*b*) manganese, (*c*) phosphorus, (*d*) sulphur, (*e*) silicon.

5 Define *each* of the following, illustrating with a sketch wherever possible: (*a*) moment of inertia, (*b*) radius of gyration, (*c*) negative bending moment, (*d*) modulus of elasticity, (*e*) point of contraflexure.

6 Describe *one* of the following processes: (*a*) the manufacturing of pig iron, (*b*) the open-hearth process of converting pig iron into structural steel, (*c*) the Bessemer process.

7 Define the following nonferrous alloy types: (*a*) the bronzes, (*b*) the brases. Discuss the composition, properties and uses of duralumin.

8 Explain briefly the water-cement ratio theory of proportioning concrete for strength.

9 Discuss the essential features of fireproof construction and describe the construction of walls, beams, columns, floors and partitions in this type of construction. Illustrate by sketches.

10 Determine the maximum longitudinal shear per square inch in a 24-inch, 115-pound I-beam loaded with two symmetrical loads of 125,000 pounds each, disregarding the weight of the beam.

11 Determine the safe load, concentrated in the center of a span 26 feet long, and the deflection of a beam of long-leaf pine, 18 inches deep and 12 inches thick.

12 Discuss the composition, manufacturing processes and uses of (*a*) plaster of Paris, (*b*) Keene's cement.

Part I
STRUCTURAL PLANNING AND DESIGN

Tuesday, January 30, 1934—1:15 to 4:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer paper.

1 What rules should be observed in

laying out stairs in apartment houses?

2 Design, a plate-girder section for a bending moment of 12,000,000 inch pounds.

3 How is the spacing of rivets in the flange angles of plate girders determined?

4 The left half of a simple beam of 20-foot span is loaded with 2000 pounds per linear foot. Where is the point of maximum moment? What is its value?

5 Explain briefly the operation of a pneumatic caisson; illustrate with a schematic diagram.

6 A cast-iron lintel, supporting masonry over a doorway, has the form of an inverted T. Explain how this shape uses the material to the best advantage.

7 A two-floor library is to be built on a plot having a frontage of 50 feet and a depth of 100 feet. Light is available only at front and rear. Sketch a plan of the adults' department on the ground floor, showing reference room, fiction and nonfiction divisions, tables, bookshelves, offices, toilets, etc.

8 A column 10 feet high supports a central load of 135,000 pounds. Pick a rolled-steel section by the formula 16,000—70 l/r, minimum l/r of 100. Design also a corresponding concrete column with $fc = 500$, $n = 15$, $p = 0.025$, and sketch section.

9 Two plates 18″ x ¾″ in section are to be spliced for tension by two plates 18″ x $^7/_{16}$″. Using $^7/_8$″ rivets, design and sketch a splice for maximum efficiency, using these stresses: tension 16,000, shear 12,000, bearing 24,000 pounds per square inch.

10 What load per square foot may be placed on a warehouse floor of 4″ x 12″ long-leaf yellow-pine joists 24″ on centers on a 16′ span?

11 A riveted connection consisting of 16 rivets set in four rows of four rivets each, with 3-inch spacing in both directions, is subjected to a moment in the same plane of 100,000 inch pounds. What rivet has the maximum stress and what is the amount?

12 Design a section of a concrete beam, reinforced for tension only, to resist a bending moment of 800,000 inch pounds.

Part I

MECHANICAL DESIGN AND ELECTRICAL PRINCIPLES

Wednesday, January 31, 1934—9:15 a. m. to 12:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 What will be the size in horsepower of an electric motor required to drive a fire pump that handles 500 gallons of water per minute, raises it through an elevation of 100 feet, and discharges it through a nozzle with a velocity of 50 feet per second? Neglect losses.

2 What will be the size in horse power of an electric motor required to drive a reciprocating air compressor that compresses 100 cubic feet of free air per minute to a discharge pressure of 200 pounds per square inch? Neglect losses.

3 Steam coils are kept supplied with dry saturated steam at atmospheric pressure, condensation being drawn off immediately. If air at 50° F. is blown across the coils and heated to 120° F., how many pounds of air can be heated per pound of steam condensed?

4 *a* Find the boiler horsepower of a marine boiler having 3 furnaces, each 3 feet in diameter with grates 6½ feet long, and burning 20 pounds of coal per square foot of grate area. Assume an evaporation of 8.75 pounds of water per pound of coal.

b Should the combustion chamber of a furnace burning soft coal be larger or smaller than that of one burning hard coal? Explain fully.

5 *a* How would you determine experimentally the heat of combustion of kerosene?

b How would you determine experimentally the velocity of water flowing in a 10-inch pipe, if you had no way of weighing the discharge?

6 If one pound of ammonia liquid absorbs 550 B. t. u. during its evaporation in the cooler, how many pounds must be circulated through the cooler per hour to produce one ton of refrigerating effect?

7 Explain how the science of thermodynamics is applied in *three* of the following: (*a*) high-pressure steam turbines, (*b*) superheaters, (*c*) refrigerating plants, (*d*) modern air-conditioning plants, (*e*) Diesel engine plants.

8 *a* Why is unnecessary excess air detrimental in combustion processes having to do with the generation of power?

b Arrange the following in order of percentage of excess air commonly occurring, starting with the *maximum* percentage:

Oil-fired boiler
Gas engine
Hand-fired coal boiler
Diesel engine with solid (airless) injection
Boiler fired with powdered coal

c Explain the reasons for the differing percentages.

9 The resistance of the shunt field of a 550-volt generator is 320 ohms.

a Find the field current when the terminal voltage of the generator is 550 volts and the field rheostat is adjusted so that its resistance is 92 ohms.

b To what value must the rheostat be adjusted to give a current of 1.4 amperes in the field circuit?

10 *a* A transformer has its high-voltage and low-voltage coils, each divided into two equal parts. Each high-voltage coil is rated at 1200 volts and each low-voltage coil at 120 volts. Show by a diagram how you would connect the transformer to supply 120 volts from a 2400-volt system.

b Explain what takes place within the transformer so that more current will be taken by the primary winding when a greater load is put on the secondary winding.

11 Explain the meaning of *each* of the following terms: time constant of a circuit, ionization of a gas, slip of an induction motor, reluctance of an iron core, dielectric constant of insulators, corona on a transmission line, Wheatstone bridge for resistance measurement, regulation of a generator.

12 *a* An electric heater was tested for power consumption on an alternating-current circuit and was found to draw 6.7 amperes at 120 volts, r. m. s. values. The power input as determined by a wattmeter was 720 watts. What was the power factor and the angle of displacement between the voltage and the current in the heater?

b How much energy can be stored in a 0.005-microfarad condenser when charged to 20,000 volts?

12 In connecting a 20-hp., 220-volt direct-current motor to a 240-volt two-wire supply circuit, what size copper wires should be used if the motor is located at a distance of 600 feet from the nearest terminals of the supply circuit? Assume 85% efficiency for the motor, and a resistivity of 10 ohms per circular-mil foot for the wires.

14 A wire has a resistance of 24 ohms at 20° C. If its temperature coefficient of resistance is 0.0045 per Centigrade degree, what will be the resistance of that wire at 80° C? Compute also its resistance at—40° F.

15 Determine the relative cost of copper for transmitting electric power by a 115-volt two-wire system and by a 230-115-volt three-wire system (both direct current), if the power transmitted, the line losses and the length of the lines are the same for both systems.

16 *a* Explain, with diagrams, how shunts and multipliers are used to extend the range of a millivoltmeter.

b Explain how a lead storage battery operates on charge and discharge.

c Explain how a vacuum tube can set up electrical oscillations in an antenna.

Part I

ENGINEERING ECONOMICS AND PRACTICE

(Administration)

Wednesday, January 31, 1934—1:15 to 4:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 State and discuss briefly the various elements that enter into the cost of producing, transmitting, distributing and selling a kilowatt hour of electrical energy. State the various methods of charging for the energy, including the type of meter required for each method.

2 A power company offers the following power rates:

First 30 hours use per month of the maximum demand, 7c per kw-hr
Next 30 hours use per month of the maximum demand, 5c per kw-hr
Excess kw-hr used per month, 2c per kw-hr

What will be the user's power bill if he has a maximum demand of 12 kw and consumes 2500 kw-hr during the month?

3 Outline the method you would follow and the tests you would make, if any, to determine whether it would be more economical to bank a heating boiler for 14 hours daily while the building it served was unoccupied and then heat it up in the morning, or to maintain the temperature of the building continuously.

4 An electrochemical company has a metal-reduction plant, the greater part of which is a hydroelectric plant, the energy from which will go to waste if not used in the production of metal.

The company has $2,500,000 of 6%

bonds outstanding; taxes are $40,000 per year; company overhead is $110,000 annually and ordinary charges to the reserve fund are $55,000 per year.

The capacity of the plant is 12,000,000 pounds per year. The production cost is 3c per pound for labor. Raw material costs 1c per pound of meta' produced and is purchased from outside sources. The output has sold for 11c per pound. With the arrival of the depression, the demand for the product drops to 50% of the plant capacity, and the price falls to 8c per pound. Should the company continue to manufacture at full capacity, or shut down, or run at part capacity? The company estimated that the depression will last two years and that it will take five years after the depression ends before any surplus can be marketed. Give reasons and figures to support your opinion.

5 Discuss from the standpoint of the *owner*, the relative advantages and disadvantages of a contract based on unit prices for items and cost-plus work.

6 The development of mine-mouth steam power plants for the generation of electrical energy is often advocated as a means of saving the burden due to the transportation cost of fuel. Discuss the advantages and disadvantages of such projects and state why they are seldom feasible.

7 Name *three* purposes for which railroad valuations may be desired and describe *one* method of making such a valuation.

8 Define *five* of the following: proposal advertisement, lump-sum contract, cost-plus contract, unit-price contract, proposal, bidder's bond, surety bond, specifications, extra work, retained percentage, liquidating damages.

9 It is required to heat 10 cubic feet of water from a temperature of 40° F. to a temperature of 190° F. Assuming a thermal efficiency of 80% and an energy cost of 3c per kilowatt hour, find the cost.

10 Outline the bases and the methods of valuation of utilities for any *two* of the following purposes: capitalization, taxation, purchase, rate making.

11 State and discuss *two* methods of charging for professional engineering services, stating the conditions and the nature of services to be rendered that are particularly adaptable to the methods you select for discussion, together with the reasons therefore.

12 Define a corporation. How is it organized, established, managed and terminated? What advantage does it have over a partnership?

Part II
MECHANICAL ENGINEERING
(First half)

Thursday, February 1, 1934—9:15 a. m. to 12:15 p. m. only

Answer any five of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

Return at 1:15 p. m. for the second half of this examination.

1 How many 60-ton cars can be hauled up a grade of 0.5% combined with 6-degree curve at a speed of 10 miles per hour by a locomotive of the following dimensions?

Cylinders 24″ diameter x 32″ stroke.
Driving wheels 56″ diameter
Steam pressure 180 pounds
Total heating surface 4466 square feet

Total weight of locomotive and tender 200 tons

2 Describe how you would conduct a thermal-efficiency test of a boiler plant. Give essential test data, method of obtaining them, and their significance and use.

3 An electrically driven direct-connected centrifugal pump is required for boiler feed water. The boiler horsepower is 1200, operating at 150 pounds per square inch gauge pressure; pump lift and friction are equivalent to 20 pounds per square inch. What capacity pump in g. p. m. is required and what should be the horsepower of the driving motor? Use your own idea of a reasonable pump and motor efficiency.

4 What horsepower can be transmitted at 200 r. p. m. by a cast-iron gear of 14″ pitch diameter with 42 teeth, with face width of 3″, 15° involute?

5 What are the essential characteristic differences between a Diesel-type and a four-cycle-type internal-combustion engine?

6 A hydraulic jack is to be designed to lift 4500 pounds. The diameter of the small plunger is ½″. It is operated by a lever 10″ long which is connected to the plunger ¾″ from the fulcrum. The effort in the end of the lever must not exceed 25 pounds.

a Determine the diameter of the larger plunger. Make a sketch.

b What is the pressure per square inch upon the large plunger?

7 *a* What is a ton of refrigeration?

b Name the common refrigerants used in mechanical refrigeration.

c What is the volumetric efficiency of a compressor?

d How is the volumetric efficiency affected by cylinder clearance?

8 A line shaft is 40 feet long and is made of cold rolled steel. Power is transmitted to the shaft by a pulley at one end and is taken off of a pulley at the other end. The shaft rotates at 200 r. p. m. and is to transmit 40 horsepower. What must be the diameter so that the angle of twist in the 40-foot length will not exceed 4°?

9 Describe briefly the outstanding personal contribution of *each* of the following to the science of management: Frederick W. Taylor, Henry L. Gantt, Harrington Emerson, Frank Gilbreth.

10 Describe briefly any good quality control system for either mass production or job-order production with which you are familiar or one that you would set up. Point out the requirements to be met for the successful operation of the system.

Part II
MECHANICAL ENGINEERING
(Second half)

Thursday, February 1, 1934—1:15 to 4:15 p. m. only

No reference books or notes may be used. Return this sheet with your answer papers.

Select some engineering project that you have designed or helped to design or that you have had responsibility in constructing, write a complete description of it, giving figures, details, sketches, etc., and describe the engineering problems you had to solve and how you solved them. As far as possible, write in a professional manner, using technical and engineering terms, and in a footnote, where you consider it necessary, define these terms so that a layman will understand their meaning. Give figures, quantities, dimensions, details and sketches, as necessary, describing engineering problems you face and your solution of them. In case you have been interested in an investigation or in some engineering research, you may select this as your subject. Remember that you have three hours for this paper, so take plenty of time in planning what you wish to say and in determining the order of presentation, and then write your paper carefully.

Part II
CIVIL ENGINEERING
(First half)

Thursday, February 1, 1934—9:15 a. m. to 12:15 p. m. only

Answer any five of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

Return at 1:15 p. m. for the second half of this examination.

1 The embankment of a railroad crosses a stagnant pond, the bottom of which is soft material. State what method you would pursue in making an earth fill across this pond in order to obtain a permanent embankment.

2 Outline the principal steps required in the theoretical design of a retaining wall. Illustrate by sketch.

3 In the construction of a weir for measuring the flow of water from any source, state clearly all the requirements in form and arrangement that are necessary for the most accurate results.

4 A watershed has an area of 10 square miles with 5% water surface and a mean annual rainfall of 40 inches, 40% of which is available for storage. Calculate the storage necessary for a daily supply of 5,000,000 gallons, and the dimensions of a spillway to provide for a flood of 80 cubic feet per second per square mile. Assume all other data you may need to solve this problem.

5 Design a semicircular arch culvert for a highway, to pass the drainage of 5000 acres in open rolling country. Show by sketches the approximate construction.

6 Describe briefly the operation of supporting and moving a large water main so as not to interfere with its use.

7 Describe damp-proofing and its method of application.

8 Compute the number of barrels of cement, cubic yards of sand and cubic yards of broken stone that will be required to make 10 cubic yards of concrete (1:3:5 mix), assuming the voids in cement to be 0%, in sand 30%, and in broken stone 40%.

9 *a* Suppose that a dam is to be founded on rock; the rock, when uncovered, is found to be seamed with water coming up at points. What should be done to prepare this rock for a proper foundation?

b Suppose that there is discovered a spring with considerable head; what should be done?

10 Explain the method of designing a steel water tower 100 feet high and 40 feet in diameter.

Part II
CIVIL ENGINEERING

(Second half)

Thursday, February 1, 1934—1:15 to 4:15 p. m. only

No reference books or notes may be used. Return this sheet with your answer papers.

Select some engineering project you have designed or helped to design or that you have had responsibility in constructing, write a complete description of it, giving figures, details, sketches, etc., and describe the engineering problems you had to solve and how you solved them. In case you have been interested in an investigation or in some engineering research, you may select this as your subject. Remember you have three hours for this paper, so take plenty of time in planning what you wish to say and in determining the order of presentation, and then write your paper carefully.

FOR LAND SURVEYING

Part I
MATHEMATICS

Thursday, February 1, 1934—9:15 a. m. to 12:15 p. m., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 If the length of a rectangular field were increased by 2 rods and its width diminished by 5 rods, its area would be 80 square rods; if its length were diminished by 4 rods and its width increased by 3 rods, its area would be 168 square rods. Find its length and width.

2 Write the equations of the sides of a triangle if its vertices are the points (2,1), (3, — 2), (— 4, — 1).

3 The bounding lines of a township form a triangle of which the sides are 8.943 miles, 7.2415 miles and 10.817 miles. Find the area of the township.

4 The diagonals of a rhombus are 90 yards and 120 yards. Find the area of the rhombus, the length of one side and the perpendicular distance between two parallel sides.

5 Find the distance by the shortest route from San Francisco, latitude 37° 48′ N., longitude 122° 28′ W., to Batavia in Java, latitude 6° 9′ S., longitude 106° 53′ E.

6 Multiply $a + 2a^{2}/_{3} - 3a^{1}/_{3}$ by $2 - 4a^{-1}/_{3} - 6a^{-2}/_{3}$

7 The area of a regular octagon is 2478 square inches; find its perimeter.

8 What is the equation of the tangent to the circle $x^2 + y^2 = 250$ at the point whose abscissa is 9 and whose ordinate is negative?

9 The frustum of a right circular cone 14 feet high has a volume of 924 cubic feet; find the radii of its bases if their sum is 9 feet.

10 if $x = \sin^{-1} {}^{3}/_{5}$, find cos x and tan x.

11 The area of a rectangular field is 216 square rods and its perimeter is 60 rods; find its length and width.

12 A triangular lot has one side 285.4 feet long. The angles adjacent to this side are 41° 22′ and 31° 19′. Find the area of the lot and the length of a fence around it.

Part II
LAND SURVEYING

Thursday, February 1, 1934—1:15 to 4:15 P. M., only

Answer any eight of the following questions. Slide rule and any reference books may be used. Return these questions with your answer papers.

1 Define *each* of the following: bearing, azimuth, deflection angle, traverse, latitude, departure, bench mark, stadia, profile, contour line.

2 Given the following field notes of a closed traverse; compute the error of closure, balance the survey and compute the area inclosed:

Station	*Distance in feet*	*Bearing*
A	333.8	S. 51° 3′ E.
B	306.2	S. 58° 6′ W.
C	274.3	N. 29° 21′ W.
D	189.1	N. 45° 33′ E.

3 Given latitude 57° North, declination 12° North and local apparent time 9:00 a. m., calculate the true bearing of the sun.

4 A deed shows the magnetic bearings of the sides of a triangular field run in 1880 to be N. 26° 30′ E.; S. 10° 15′ E.; S. 81° 45′ W. The magnetic declination of the needle in 1880 at that place was 6° East and in 1934 it is 1° 15′ West. What are the magnetic bearings of the lines in 1934?

5 Describe fully the process of adjusting the transit.

6 Given a right triangle whose base is 47.87 chains and perpendicular 54.46 chains. From a given point without the triangle, it is required to run the center line of a straight highway so as to leave 1/6 of the triangle on one side of the center line and 5/6 on the other side. From the vertex of the acute angle at the base of the triangle, the distance to the given point is 20 chains, and the line connecting the vertex of the acute angle at the base with the given point makes an angle of 30° with the hypotenuse of the right triangle. Determine the position of the required center line.

7 Assume that you are required to establish a straight line with a transit where successive set-ups will be necessary. Describe clearly and concisely the method you would use to insure a straight and accurate line.

8 Write, for legal conveyancing, a description of some piece of land. Assume all necessary data.

9 The deflection angle between two tangents of a highway center line is 36° 15′, and the intersection is at station 146 + 75. The tangents are to be connected by a 4° 30′ curve. Show the notes concerning this curve as they would appear in your transit notebook.

10 Discuss concisely the duties and legal limitations of the land surveyor in the matter of resurveys and the problems due to lost corners.

11 Make up a complete set of profile level notes through *four* turning points and *twenty* profile points. Show check on your notes.

12 Describe the method of determining the true north by observation on Polaris.

A Hope Fulfilled

(Continued from Page 3)

Society must carefully chart its course. It must, from the outset, be responsive to the opinions of those whom it represents. It must recognize that in the conduct of its affairs every engineer is first a citizen and secondly a peer of his profession. There must be no grades or classes of membership. Honors and distinctions for scientific or technical accomplishments should be left to others. The policies and objectives of the Society must be confined to the social, economic and professional concerns of engineers. It must avoid entering those fields which have been so ably cared for by the Founder Societies.

The new organization will be composed of State units. Where State Societies exist they will continue in accordance with such constitutions as they may desire. Those who have delegated to frame the structure must bear in mind the hopes and objectives of those units which will represent the profession in the several states. The laws which govern the practice of engineering vary in every State, and each State Society needs must function in such manner as to interest and command the respect of the citizenry and to improve and make effective the legislative enactments regulating the profession. The National Society of Professional Engineers must function as does government and not as do existing engineering societies. In common with the professional groups which represent lawyers and doctors, it must recognize the value of county, state and national organization and set its face toward accomplishments in the interest of civic and professional development.

The creation of a national agency representative of the professional engineer in the United States is a recompense to those whose endeavors in founding and building the State Professional Society were so long complacently endured or disdainfully tolerated by the smugly complacent to whom the status quo can not or should not be disturbed.

The American Engineer looks with hope upon the prospects for the future.

* * *

Relief Work

(Continued from Page 4)

other C. W. A. workers engaged on productive work, particularly the engineers, architects and other professional workers, once having been reclaimed, should have been gradually transferred to some Recovery Administration, or a new Recovery Administration should have been created to carry on and direct their work which was already in progress.

To turn these men back upon Charity payrolls at a reduced wage is certainly creating a paradoxical situation out of tune with the aims of the N. R. A. and the Code of Fair Competition. When these men went back to their first foot-hold, (Welfare work), it amounted to a general retreat at a time when what was really needed was another advance from C. W. A. to P. W. A. or N. E. C. To have accom-

plished an advance movement instead of a retreat, at that critical time would have meant pushing all productive work then in progress by all the Government Recovery Administrations, thereby accelerating the manufacture of capital goods and service industries, which of themselves, normally employ half of our people.

Again, just why Federal and State funds should be earmarked Welfare or Relief for one group of productive workers, and P. W. A., N. E. C. or N. R. A. for another group of productive workers doing similar work, is difficult to understand and smacks of class distinction, which of itself is un-American. But this is not all, the professional engineers and architects working on P. W. A., N. R. A., N. E. C., etc., are paid higher rates of wages than the professional engineers and architects rendering similar service though they were forced back on Welfare payrolls and subjected to further indignities by being forced to sign what amounted to a pauper's affidavit.

This is the condition which confronts thousands of professional engineers and architects, the condition which the professional societies are called upon to rectify.

While the Federal Government proceeds on the policy of hiring millions of men, professional or otherwise, to do productive work directly or indirectly through Welfare or Charity organizations, and at Welfare wages, just so long will recovery be retarded.

If the National Recovery Act means anything, such a policy operating over such a wide front and involving the welfare of millions of workers, can only serve to undermine and devitalize the N. R. A., the aim of which is coordination within industry.

It would be more logical then for the Government where it is providing Federal funds, to pay recovery wages to all workers on productive work, and not to classify some as Welfare workers when they are all doing productive work.

Another really vital phase that cannot be glossed over is the fact that these engineers, architects and other white collar groups are slowly having their moral fiber sapped away. Prominent among the psychological aspects of this widespread economic depression is the degree to which this unprecedented unemployment has affected men's attitudes and their morale. Charts have been plotted by psychiatrists indicating the morale of men with jobs of a permanent nature, temporary jobs, welfare jobs and no jobs at all. These tests, singularly enough, were made upon several hundred engineers, by a series of definitely planned questions. The results showed a heavy loss in the morale of the jobless and welfare engineers.

It is while their morale is low, and when they have been forced to take their places with the mass of unemployed, that, knowingly or otherwise, they become a part of the great mass, class struggle.

There is no use adjuring them to hold aloof. They DO take part, and are taking part, because they are men before they are engineers and architects, and because human lives and interests are involved. They are likely to find that they have been led into it without their knowledge, and because of their low morale. The chances are they will find themselves on a side which they might not have chosen consciously, in this great class struggle.

This brings us to the principle question with which the unemployed engineer and architect is confronted, what are the technical Societies going to do to get these engineers and architects separated from charity organizations?

The writer suggests that all your Technical Societies urge Washington that all this productive work be transferred to some Recovery Administration, such as the National Economic Council under Mr. Frank Walker, who should set up a State and Municipal Administration. It is suggested that such new divisions of the N. E. C., in an orderly planned manner, divorce the Welfare Departments from directing and carrying on productive work; and only such persons as are deemed unfitted for productive work remain under the direction of the Welfare Department and that this proposed Administration be kept solely on productive work by those persons qualified to do it.

This draws the line clearly and definitely and is a challenge to the N. R. A. to set an example, by strictly following the Code of Fair Competition. This would mean that Federal funds running into millions of dollars daily, would no longer be earmarked to be expended through charity organization, when, in fact, the bulk of the work being done with the aid of this Federal money is strictly productive and not "found" work.

Unless the now incoherent units of productive construction work are blended into a unified structure by a basic, single plan, the Recovery Administration is not consistent, but is a violator of its own codes and so defeats its own ends.

* * *

Do We Need Birth Control for Ideas?

(Continued from Page 5)

the knowledge that two and two equal four was revealing a fundamental truth. If others distort that truth that is not his fault. The scientist, digging out the truth of the natural laws so that they can be used by mankind, cannot be blamed if they are abused any more than the miner who digs out gold, can be blamed because that mineral is later misspent in business in the form of money.

Blaming the inventive genius of mankind for the recent depression and our troubled times reveals the fallacy of episodic thinking. Depressions have happened throughout history—centuries before the Machine Age. One of the greatest panics and economic upsets in history was the Tulip Craze in Holland which reached its climax in 1637. Tulips wrecked the finances of Holland and impoverished a people because of the insane desire for them. But the tulip remains as it was then, a beautiful flower. It was not the flower's fault.

Yet the flower was blamed. If you will reread your history you will learn that sincere efforts were made following the crash at that time to forbid the planting or growing of tulips! Is there not today something of a whimsical parallel?

Another equally wild thing which wrecked France and staggered the economic world in 1717 was the Mississippi Bubble. That wrecking of the world was based on high hopes of vast fortunes out of the Mississippi River. The great "Father of the Waters" was not to blame. "Old Man River" still rolls along, just the same as it always did. So will that great evolutionary stream of mankind: industrial, economic, and social development—just as steadily as the scientists apply the laws of nature to the cause of mankind.

History records that there were great depressions in 1837, 1857, 1873 and 1893—all before mass production. History also shows very clearly that there was always a prolonged depression after every war. And a little while ago we went through the greatest war in all history. Yet blithely some of the social philosophers and a few of the economists blame the inventor and the Machine Age.

If all the inventive, creative genius of mankind were to be arrested, locked up, for a period of years, what would happen? Life would then become stabilized indeed. The only stabilized civilization we know of today is that of the interior of China and the only completely standardized life is that of the primitive savage.

Here we find absolute stabilization because man's creative imagination is largely non-existent. So much for the bugaboo of "standardization" because of the Machine Age. The common people of China wear the same hats, the same shoes, the same clothes as their ancestors did thousands of years ago and the primitive savage in the heat of Africa enjoys his standardized nakedness.

Much of the confusion in the public mind over the problem we are discussing is due to the terminology that is used.

When the average citizen hears of a research engineer, he immediately thinks of a man who is devoting his life to that awful thing, standardization. However, to the research engineer that word means one thing and to the average citizen, and some social philosophers, it means something wholly different.

Standardization of procedure, in the machinery of production, such as a general agreement on the exact thread on all nuts and bolts, is one form on which all of us are agreed. That is for the public convenience as well as for the manufacturer.

Standardization of the finished product, however, is what the research engineer wages constant war against. He knows that as soon as the goods offered the consuming public become standardized, stagnation sets in. And when that happens there is no other outlet for the supply of manufactured goods but cut-throat competition. Price advantage is offered as against the improved product. This is inevitable.

It is the research engineer's task to keep the Machine Age alive by bringing about change. He is the hope of our civilization as the one true social evolutionist.

Again there is confusion over the word research. What does it mean?

Research is simply trying to find out what we are going to do when we can't keep on doing what we are now doing.

Just pouring out standardized goods in mass production will not solve our problems. Mass production is a means to an end. You cannot turn out three times the amount of goods the market will absorb. Such procedure is a violation of the law of supply and demand, which is as positive as the law of gravitation.

The basic law of business is simply this: A study of the human needs and the creation of things to gratify that desire. Every element of that most complicated of all studies, human nature, enters into this fundamental principle of business.

Let us take a specific example of the human element in business. You desire to buy a car this year. You will insist, of course, on one of the 1934 models. We will say you have paid an even $1,000 for that automobile. It is yours but you have not driven it. It has never touched the pavement of the streets. It is completely new.

But, instead of taking it out on the highway, you use it for an experiment. You wrap it in cellophane or put it in a glass case. You keep that car for ten years. Then you take it out on the market and seek to sell it. Will you be able to realize your $1,000? You will not. Nobody wants that car because it has been outmoded. New cars have come, new inventions, new appliances, new ideas. Yet it is a perfectly good car and will run as well in 1944 as it will today. But your modern public will not want it.

In this connection the economist, who would stem the tide, overlooks another one of the most vital phases of human nature—the horror of monotony. Nothing is more deadening to the imagination of mankind, to its happiness, and to its progress than monotony.

No, our problem is not that of overproduction, per se. There is an overproduction of old things but there is vast under production of new things. That is really what is wrong with us.

It has been shown that thirty per cent of the people of the United States produce more food than we need and another thirty per cent produce more than enough manufactured articles. What, then, to do with the other forty per cent—how are we to obtain for them gainful employment?

There is only one course open to us: To study human needs and to create new ones. We have just scratched the surface in the task of giving every man and woman and child a complete, a secure, and a happy existence on this earth. Anybody who thinks the building of America, for example, has been finished, that the task is over and that we must slow down, has no vision of the future.

It is up to the research men of the world to find employment for that part of the forty per cent that would ordinarily be unemployed. This cannot be achieved by stopping them but by giving them orders to go full steam ahead in their great pioneering.

As a by-product of the intensive research work in the World War, the material side of our civilization took vast steps forward. Out of the war research we got the radio, aviation, tremendously valuable new chemicals, the talking motion pictures, new oils, new gases—an astounding array of new products that added to the wealth of the world and made possible the prosperity that collapsed in 1929—not as a result of those researches, but because of over-expanded credits and stock market gambling of which the research engineer, as such, had no part.

We, the human race, took the new discoveries of science as little children. We thought the material wealth alone was the end in view. We went on a joy ride and talked glibly about poverty being abolished for all time. An economic millennium was here, and there was nothing more to be done but to spend money and enjoy life. The world has gone through the old story of the Tower of Babel in modern setting.

If you give a twelve-year old child a sixteen-cylinder motor car which he does not know how to run and he steps on the gas, winding up in a ditch or against a telegraph pole, can you blame the machine? Was the engineer at fault? Hardly.

It was not the engineer who created the vast top-heavy credit structure, it was not the research man who declared the war, it was not the inventor who made possible the bull-bear battles in Wall Street. The economist and politician must give the answers to those riddles.

The research men created the new wealth of the world and its prosperity. It is not their fault that it was abused. Those who did abuse these new found riches have by now, it is hoped, learned their lessons. The joy ride is over. We are back to earth. And it is up to the researcher to bring us out of the wreckage. Therefore do not hamstring him. Assist him, do not blame him.

How would we go about it to stabilize life for a few years by preventing further technical development? How would it be rationed out as needed? What part of science would we permit to unfold and what restrain? When the economists have planned this all out I will cheerfully cooperate with them.

Let's take medicine as an illustration. The world owes the doctor and the sanitation engineers a great debt for their contributions to our general health. But they have called upon all groups of their fellow scientists for help. The physicist furnished the X-rays and all the other health restoring rays and lights. The chemists gave to them untold numbers of specific compounds. The engineer gave to them all sorts of modern equipment to make their work easier and more efficient. So that today the average patient in surgery requires a much briefer stay in the hospital than he once did, and he is returned to his family far stronger and healthier. Plagues have been swept from the earth and the life of the average individual has been stretched an amazing number of years as the result of scientific research—far removed at its beginnings from the fields of medicine.

Today it takes no longer to get a long distance telephone call through than it does a local one. Under this new plan how much longer should we wait for a call to make this industry stable? Engineering and all the the branches of science, working synthetically, have made this mechanism almost perfect. How much will we slow down our calls and who will decide which ones are to be slowed down? Will the doctor be allowed to get his calls through quickly and will the economist have to wait?

To return to medicine, will the economists who advocate a planned society with a rationing of progress, please tell us how much longer the patient will have to remain in the hospital? How much bad medicine must a patient be fed to stabilize things when science already has a cure ready for him?

Singled out for attention from these economists is the automotive industry. They hold to the opinion that the internal-combustion engine has done more to throw civilization out of joint than any one thing. It is charged with having shifted the centers of population and that it has been wasteful in discarding production machinery before it has been worn out. It has even produced new models so that people were no longer satisfied with the old ones. One specific complaint is that it has ruined the railroads. Let us consider that one first.

The automotive industry has not ruined the railroads. Rather, it has given the railroads more business than any other single industry on record. Check up on the amount of steel that is shipped over the railroads for the making of automobiles and other automotive products; also, of coal, of glass, of petroleum, of copper, and countless other materials that go into cars. It was the carrying of this freight that made America's railroads one of the nation's biggest assets, as they still are.

It is true that railroads have suffered during the depression. That is not surprising. All other businesses have. But the automotive industry, in cooperation with the railroads, is bringing about a new type of transportation. The new type of high speed Diesel propelled trains blend the years of experience in rail transportation with the inventor's abilities and the manufacturing technique of the motor industry. They, too, are working hand in hand to rebuild prosperity.

These two, the railroad and the motor car industry, are not going backward to find stabilization but forward to new systems of transportation which a few years ago would have seemed like a Jules Verne dream.

The advocates of this planned rationing of life stress especially their charge that machinery is discarded before it wears out, both the machine within the factory and the motor car itself. This is easily answered.

The whole modern factory is a special machine for making a particular product, which in many cases could not be made in any other way, no matter how skilled the workmen. However, the economists and the bankers consider these facilities as investments, one of the sacred cows of our depression.

We are told we must not change

our models or types of goods because of our investments. Trying to save our investments in obsolete equipment has been one of the things that has held up our rally from what might have been but a temporary slowing down of our pace. We would have been billions ahead if we had done this because we would not now have to pay out in taxation and charity the moneys that we have expended.

"This is all right," the economist will say, "If the advantages of the new machine are enough to make it worthwhile. But retiring them for a mere marginal advantage is sheer waste."

Does such a critic have an idea that automobile makers maintain large and alert forces of engineers running around their plants looking for places where an old machine might be thrown out for a marginal advantage? Talk with the foreman of a connecting-rod department for example. He will tell you: "I can't get a new machine unless it will pay for itself in three years"—or six months, perhaps.

If a connecting rod breaks, the foreman has no difficulty at all in getting a new one. If the old machine wears out he can without trouble order one of the same pattern. But a new machine, a new method, a new idea? Ah, then he must prove its merit first.

No sane business man spends any such money unless he knows he is going to get a substantial profit from so doing. Marginal profits of this nature just do not happen in factories—not even in the boom years. They would mean business suicide.

Instead of that picture, here is another; as I see it. If the world's manufacturers had bought new machinery more freely, if they had been less hesitant about retiring the old ones, the machinery makers would have been able to develop machines that would have led to even better factory equipment.

And if this had happened, then the capital-goods industries would not have died, nor gone into a coma, and the depression would never have touched the depths that it did. The trouble has not been any waste in retiring machines that were not worn out; the trouble has been that they were not retired soon enough. That is just where our industrial organism bogged down. Industry began to "stabilize," as the economists want it, and that is what brought on the depression—insofar as industry had anything to do with bringing it on. Business was thinking more of savings than it was of keeping alive the capital-goods industries. And they will pay for these savings many times over, in loss of business and increased taxes for unemployment.

How the economic planners are going to ration thought I do not know. Prohibition did not prevent men from drinking, and I do not see how any plan can be devised to keep them from thinking. Ideas move the world, not laws and regulations. Someone in Europe or Asia may write a scientific book. It cannot be barred from this country. Someone else will take the knowledge in that book and put it to work and thereby he will tamper with the bacteria content of milk, the tensile strength of textile yarns, or the magnetic qualities of auomobile alloy steels. Who knows what?

My own idea is that we—the human race—as yet know very little; practically nothing. We may be sure then that the greatest surety in our civilization is the instability of everything we know and do. We must keep our minds open. There is nothing permanent but change and the more violently you struggle to hold back this inevitable movement the more violent will be the reaction.

The engineers and the economists and the administrators of government and the people themselves—all of us are seeking identically the same thing. We want a steadily increasing higher standard of living. We want economic stability.

Some of the economists think we know too much already in the field of science and that our knowledge is clogging the road. The scientist knows all too well how little he knows. He knows with all his heart and mind and soul that he is just at the threshold—that he is just beginning his task of remaking the world nearer to all our desires.

There is much to be done! Study of air-conditioning alone is bringing to us a realization of tremendous possibilities. Houses will have even heat in summer and in winter and the air will be purified. As this develops, two-thirds of the buildings in America will have to be made over. There will be the greatest building program in the history of America. It will come as naturally as the motor car did, or the radio, or the talking picture.

It is one of the endless improvements that are coming as a result of the research engineer's efforts. There will be so much to do that we will again be puzzled as to how to devise means of getting it done. Everywhere we look there are tasks to perform. We will never get started on them by marking time.

Research is not Man's despair but his greatest hope.

* * *

A Request From Abroad

(Continued from Page 6)

these were made by the local authorities and by the Italian members of the Association in a liberal and extremely hospitable manner.

The decision to collaborate with the syndicate, which, like other agencies of Italy, is under the influence of a social order which, beginning in one country, has in some fourteen years sown seeds in many countries throughout the world, is an indication of a trend of thought which, appreciative of the universality of engineering, realizes the necessity for adapting the physical developments of the times to the social and economic aspirations of men.

* * *

Dipping Into the Future

(Continued from Page 7)

wisdom of spending tax payers' dollars to repair the Bigelow Hollow road in such communities the democratic form of government is ideal. But, raise the situation by some large exponential function into hundreds of thousands of people, into millions of dollars, and into impenetrable darkness as to the real issues: at once the vote means almost nothing except the obedience of the *hoi polloi* to the orders of the political boss.

Following the World War the democratic form of government rose on a wave of altruistic emotion to an all-time high. It didn't last. Came the dictator and the despot; an unhappy interlude awaiting that enlightened day when governments will be run by highly-trained professionals who *lead* the people instead of following them with an ear to the ground and an eye on re-election.

The latter is no more intelligent than if a doctor prescribed a diet based on the gastronomic whimsies of his patient. Government founded on the popular vote already reeks to heaven, but it will take another century for Americans to realize that it is lireless and to bury the corpse.

By that time the League of Nations will control military power and wars will cease. Individual nations may support a coast guard, though none may have a navy of its own. This prerogative will be reserved for the League which can thus preserve order with a very small force. (No war has ever been lost by the side that controlled the sea). My own suggestion is that these international warships be officered by Swiss, thus in happy combination assuring neutrality in all waters and giving substances to the old joke about the Swiss Navy.

Perhaps the most certain prediction is a revolution in our treatment of criminals. The present methods will then seem no more sensible than flogging now seems to us as a cure for typhoid fever. Instead of waiting till the patient is diseased and doomed before acting, preventive steps will be the rule.

We are what we are as a result of heredity and environment. Individuals with inheritable afflictions will be sterilized; children potentially delinquent because of their environment will be removed from their parents in order that they may be exposed to surroundings which will remake their desires and standards. Eventually almost no one will be vicious enough to earn for himself a year's lodging in prison. A surprising by-product will be the discovery that it costs less to give the child a wholesome environment in place of a poor one, than it does to keep prisoner the criminal he would have become.

Extraordinary progress in psychology is certain. Freud, Adler, Jung, Watson and Terman are names comparable to those of Slavery, Watt, Stephenson, Trevithick, and Murdock. Their poor little psychological atmospheric engine has rocked the world, but the equivalents of Corliss, de Laval, Parsons, and Curtiss, who will develop its asthma into the hot breath of a mighty turbine, are still to be born.

In an earlier paragraph it was suggested that we shall be able to measure personality. Technology seniors in search of a job —''' supplement a statement of their scholastic rating with a numerical figure accurately indicative of things now as intangible as emotional stability, moral courage, or charm.

The lie detector will be a dependable reality. In India today when the

Sahib wishes to establish guilt among his servants he puts a tablespoonful of rice into the mouth of each, has it kept there for a few minutes, and then commands the suspects to blow it out. The servant with the least remainder adhering to his cheeks is judged guilty. "Absurd!" someone protests. What about the fact that dry rice will not adhere, and fear impedes the secretion of the saliva? NO, it is not entirely absurd.

The pleasant pastime of attempting to penetrate the future has intrigued the minds of most thoughtful men. Probably no one has ever done it more successfully than Francis Bacon who published his *New Atlantis* at about the time our Pilgrim ancestors were assuring fame and honor to a certain rock in Plymouth. In this incredible volume Bacon made twenty-two separate predictions which he could not possibly have associated with the accomplishments of his time. Twenty-one of them are now realities, including horseless carriages, flying though the air, sailing under water, and talking over long distances.

But Francis Bacon had the outstanding scientific mind of his century—Were he alive today what would he foresee as the useful application of these cosmic rays which we are told strike our bodies at the rate of eleven a second? Health? Energy? Personality? He would certainly prognosticate the transmission of power without wires and perhaps the decentralization of cities; thus reversing the concentrative movements of the last centuries as a result of our increased facilities in the field of transportation.

Progress toward a universal language, toward personality measurement and control, toward the disappearance of the criminal and toward international co-operation;—such are the things which another century may harvest, though it is dangerous to assert them. He who arrogates to himself the role of prophet—particularly when he lacks the genius of a Bacon—lays himself open to criticism and to attack. Predicting what lies around the corner is treacherous business. Still I am comforted, for the body of competent opinion assures me that though I prove to be a false prophet you will not have the satisfaction of twitting me about it.

* * *

An Eternal Problem

(Continued from Page 8)

resolved that Filippo should receive the charge of conducting the work, but he was told that he must furnish the Syndics and Wardens with more exact information.

He returned, therefore, to his house, and stated his whole purpose on a sheet of paper, as clearly as he could possibly express it, when it was given to the tribunal in the following terms: "The difficulties of this erection being well considered, magnificent signors and wardens, I find that it cannot by any means be constructed in a perfect circle, since the extent of the upper part, where the lantern has to be placed, would be so vast, that when a weight was laid thereon it would soon give way. Now it appears to me that those architects who do not aim at giving perpetual duration to their fabrics, cannot have any regard for the durability of the memorial, nor do they even know what they are doing. I have therefore determined to turn the inner part of this vault in angles, according to the form of the walls, adopting the proportions and manner of the pointed arch, this being a form which displays a rapid tendency to ascend, and when loaded with the lantern, each part will help to give stability to the other. The thickness of the vault at the base must be three braccia and three-quarters; it must then rise in the form of a pyramid, decreasing from without up to the point where it closes, and where the lantern has to be placed, and at this junction the thickness must be one braccia and a quarter. A second vault shall then be constructed outside the first, to preserve the latter from the rain, and this must be two braccia and a half thick at the base, also diminishing proportionally in the form of a pyramid, in such a manner that the parts shall have their junction at the commencement of the lantern, as did the other, and at the highest point it must have two-thirds of the thickness of the base. There must be a buttress at each angle, which will be eight in all, and beween the angles, in the face of each wall, there shall be two, sixteen in all; and these sixteen buttresses on the inner and outer side of each wall must each have the breadth of four braccia at the base. These two vaults, built in the form of a pyramid, shall rise together in equal proportion to the height of the round window closed by the lantern. There will thus be constructed twenty-four buttresses with the said vaults built round, and six strong and high arches of a hard stone (Macigno), well clamped and bound with iron fastenings, which must be covered with tin, and over these stones shall be cramping-irons, by which the vaults shall be bound to the buttresses. The masonry must be solid, and must leave no vacant space up to the height of five braccia and a quarter; the buttresses being then continued, the arches will be separated. The first and second courses from the base must be strengthened everywhere by long plates of macigno laid crosswise, in such sort that both vaults of the Cupola shall rest on these stones. Throughout the whole height, at every ninth braccia there shall be small arches constructed in the vaults between the buttresses, with strong cramps of oak, whereby the buttresses by which the inner vault is supported will be bound and strengthened; these fastenings of oak shall then be covered with plates or iron, on account of the staircases. The buttresses are all to be built of macigno, or other hard stone, and the walls of the Cupola are, in like manner, to be all of solid stone bound to the buttresses to the height of twenty-four braccia, and thence upwards they shall be constructed of bricks, or of spongite (Spugne), as shall be determined on by the masters who built it, they using that which they consider lightest. On the outside a passage or gallery shall be made above the windows, which below shall form a terrace, with an open parapet or balustrade two braccia high, after the manner of those of the lower tribunes, and forming two galleries, one over the other, placed on a richly-decorated cornice, the upper gallery being covered. The rain-water shall be carried off the Cupola by means of a marble channel one-third of an ell broad, the water being discharged at an outlet to be constructed of a hard stone (pietra forte), beneath the channel. Eight ribs of marble shall be formed on the angles of the external surface of the Cupola, of such thickness as may be requisite; these shall rise to the height of one braccia above the Cupola, with cornices projecting in the manner of a roof, two braccia broad, that the summit may be complete and sufficiently furnished with eaves and channels on every side; and these must have the form of the pyramid, from their base, or point of junction, to their extremity. Thus the Cupola shall be constructed after the method described above, and without framework, to the height of thirty braccia, and from that height upwards it may be continued after such manner as shall be determined on by the masters who may have to build it, since practice teaches us by what methods to proceed."

When Filippo had written the above, he repaired in the morning to the tribunal, and gave his paper to the Syndics and Wardens, who took the whole of it into their consideration; and, although they were not able to understand it all, yet seeing the confidence of Filippo, and finding that the other architects gave no evidence of having better grounds to proceed on,—he moreover showing a manifest security, by constantly repeating the same things in such a manner that he had all the appearance of having vaulted ten Cupolas;—the Syndics, seeing all this, retired apart, and finally resolved to give him the work; they would have liked to see some example of the manner in which he meant to turn this vault without framework, but to all the rest they gave their approbation. And fortune was favourable to this desire: Bartolommeo Barbadori having determined to build a chapel in Santa Felicita, and having spoken concerning it with Filippo, the latter had commenced the work, and caused the chapel, which is on the right of the entrance, where is also the holy water vase (likewise by the hand of Filippo) to be vaulted without any framework. At the same time he constructed another, in like manner, for Stiatta Ridolfi, in the church of Santo Jacopo sopr' Arno; that, namely, beside the chapel of the High Altar; and these works obtained him more credit than was given to his words. The Consuls and Wardens feeling at length assured, by the writing he had given them, and by the works which they had seen, intrusted the Cupola to his care, and he was made principal master of the works by a majority of votes. They would nevertheless not commission him to proceed beyond the height of twelve braccia, telling him that they desired to see how the work would succeed, but that if it proceeded as successfully as he expected, they would not fail to give him the appointment for the remainder. The sight of so much obstinacy and distrust in the Syndics and Wardens was so surprising to Filippo, that if he had not known him-

self to be the only person capable of conducting the work, he would not have laid a hand upon it; but desiring, as he did, to secure the glory of its completion, he accepted the terms, and pledged himself to conduct the undertaking perfectly to the end. The writing Filippo had given was copied into a book wherein the purveyor kept the accounts of the works in wood and marble, together with the obligation into which Filippo had entered as above said. An allowance was then made to him, conformably with what had at other times been given to other Masters of the works.

* * *

Conference of Organizations of Professional Engineers

(Continued from Page 9)

in this decision it was recognized that the experience of both State Chapters and existing State organizations should be the best guide for future recommendations. Announcement of this Committee's personnel appointment will be made shortly.

To the two related questions—

1. Shall all Members of the State Societies become automatically Members of the national Society?

2. Shall all licensed members of the national society become automatically members of the State Societies in the States in which they reside?—the votes were affirmative and unanimous.

To the question—"Shall membership in any one division (National Society, State Society, or County Chapter) involve automatically membership in all three divisions?"—the voting was at first divided. Nationalistic and "States Rights" adherents were as positive in their view points as are and always have been similar adherents in the National Halls of Congress. When, however, Mr. Arthur V. Sheridan declared that no State autonomy should be lost, that the Committee on the Constitution should draft the Constitution to protect State identity, that the chaper unit and idea should be preserved, that the national organization was to be patterned after our National unity of Sovereign States, the opposition vanished and the vote on this question was affirmative and unanimous.

On the matter of the magazine, and to the question—"Shall there be one publication, devoted to the professional interests of the Engineer, publishd by the combined organization? (Names suggested: "Professional Engineer," "American Engineers")—the tentative decision was reached to publish the publication under the name of "The American-Professional Engineer."

It was further determined that the fundamental conception of such an organization is recognized to be "Service," and that unless the proposed National Society of Professional Engineers could serve the professional engineer in employment, in organized representations of his rights in legislation calculated to advance his welfare, in social service, and in nationwide professional unity, there could and would be no point in organizing. Therefore, the editorial policy with respect to the publication of the magazine shall adhere to the above conception.

In the consideration of immediate organization procedure, it was voted that temporary authority should be vested in a temporary chairman, and secretary. Dr. D. B. Steinman, of New York, was nominated and elected to be Temporary Chairman. Gerald W. Knight, of New Jersey, was nominated and elected to be Temporary Secretary.

Appointment of Executive, Constitution, Membership and Publication committees was carried over until the evening session.

The meeting then adjourned for dinner. A splendid meal was served at 6:30 at the Columbia University Club, 4 West 43rd Street, twenty men partaking.

The evening session was opened by Dr. Steinman by announcing the Committee appointments. These follow:

Commitee Appointments

Executive: — Arthur V. Sheridan, Ch.; Donal L. Chamberlain, James H. Griffin, Gerald W. Knight.

Membership:—T. Keith Legare, Ch.; Morris Goodkind, Frederick R. Harris, Willard S. Conlon.

Constitution: John Charles Riedel, Ch.; T. Keith Legare, R. M. Boynton, L. A. Keast, Victor Gelineau.

Publication:—Hugh A. Kelly, Ch.; Arthur V. Sheridan, James H. Griffin, Charles Gilman.

To the question, "Where shall the National Headquarters be located?"—three places were mentioned, namely, New York, Chicago and Washington. On motion, the City of Washington was designated, voted upon and carried unanimously.

As to the time and place of the first annual convention, it was decided to leave that matter to the Executive Committee.

For the first very preliminary expense in getting out copies of these minutes, notices, postage, temporary stationery, etc., it was decided to accept $25.00 contributions from each of the Society units represented, New York, New Jersey, Connecticut, South Carolina and the American Association of Engineers, each agreeing to forward that amount to the Secretary, Gerald W. Knight, 38 East Park Street, Newark, N. J. The same amount may be expected from the Pennsylvania Society when its delegate obtains State approval.

The committee on Constitution was requested to have its draft ready not later than September 1st. It was the consensus of opinion that the Constitution should be ratified by all State organizations, and that said ratification be secured, where possible, not later than October 1st, 1934.

In consideration of questions of detail, the matter of dues produced the most spirited discussion. It was recognized by all delegates that funds for a national organization, particularly at this time, must be limited to the smallest possible minimum. Dr. Steinman made an eloquent appeal for uniformity. His plea saved this discussion from being postponed. A tentative decision was finally reached in which allowance was made for average chapter and state dues. The publication of the magazine was estimated to cost approximately $1.00 per year per member. The least cost for an effective national administration was estimated to be $3.00 per member. Upon the final vote, the amount of $4.00 was set as the amount which the national organization would receive, including the $1.00 for the magazine. State and chapter dues were to be left to the State and Chapter organizations. Where no State and Chapter organizations exist, the dues for membership were set at $10.00, $4.00 of this amount being allocated to national purposes, and the balance to be used to organize and develop the local organizations and to establish licensing laws. Local autonomy in the collection of dues is to be observed where there is an existing agency, the national society to bill and collect where no established precedent has been established.

With a vote of thanks to Dr. Steinman for his hospitality as host, and mutual congratulations for a great work started, the meeting adjourned at 10:30 P. M.

* * *

Annual Meeting

(Continued from Page 10)

Directors (for three years): Thomas C. Desmond (Orange), William T. Field (Jeff-Lewis), Irving Hochstadter (Nassau), Charles S. Keating (Onondaga), Edgar A. McKenna (Queens), Raphael J. Smyth (Bronx), Alfred E. Roche (Rensselaer), S. B. Ehrenrich (Steuben Area).

The revised Constitution failed of passage. Although the ballots cast indicated a sentiment of more than two to one in favor of the proposals submitted by the Committee, the affirmative vote was not sufficient to comply with the requirements of the present Constitution. Failure to vote, the Great American Habit, and, the presence of blank votes accounted for the defeat of the proposed Constitution.

The social part of the program lasted until the middle of the evening. It was a most outstanding feature and to Chairman Joseph F. Lamb and his Committee of Metropolitan Chapter Presidents the appreciation of those who enjoyed it was expressed in no uncertain terms. The post-meetings of the Society afford opportunities for contacts that are seldom possible in the usual engineering gathering.

The services rendered by the Committee which arranged for the entire program of the day merit bearing in mind for future occasions. To the several Chapters, whose generosity made possible the refreshments, the Society as a whole is indebted.

Chapter News

(Continued from Page 11)

on the "Proposed waterfront Development"; Mr. Harry H. Brown, Resident Engineer, South Grand Island Bridge and Mr. Samuel J. Whitehead, Resident Engineer, North Grand Island Bridge, on the unusual and interesting problems encountered during the construction of two Grand Island bridges which are now under contract.

The report of this meeting was received through the courtesy of Mr. Fletcher H. Burke, Secretary of the Chapter.

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New York County

The following report has been received from the New York County Chapter.

"The Chapter has been most active of late through its various committees, two of which are particularly busy. President Balcom has appointed Mr. Edwin A. Kingsley chairman of a group composed of Messrs. A. Jordan Bernstein, Allen Coggeshall, Jacob Mark and George Pistor, formed to study commercial building financing and mortgage money, with a view to making recommendations which might improve the condition of the building business. They have already enjoyed the active participation in their work of such helpful men from outside the society as Mr. Shreve, Architect and Mr. Irons, Builder, and they will soon issue a resolution designed to stimulate legislative interest. The City Charter Committee composed of Messrs. S. A. Callahan, T. Hayden Hamilton, Maurice Goodman and W. H. Weiskopf, Chairman, is reporting progress in formulating a program by means of which a unified action of the five borough chapters can be attained. The aim is to procure for the profession just recognition in the proposed new city charter.

* * *

Broome Area

The Broome Area Chapter held a meeting on April 25th, in the City Hall at Binghamton, New York.

The following officers and directors were elected: President, Mr. Edward E. Stickney; Vice-President, Mr. Walker B. Lounsbery; Secretary-Treasurer, Mr. Herbert W. Grow; Directors: Mr. Leo Nyman, Mr. A. W. Bowie, 1 year; Mr. George W. Bradley, Mr. R. B. Hoadley, 2 years.

President Stickney appointed the following members to serve on a Membership Committee: Mr. John A. Giles, Binghamton, Chairman; Mr. George W. Bradley, Broome County; Mr. James H. Thomas, Otsego County; Mr. W. J. Howland, Delaware County; Mr. W. C. Ruland, Schoharie, County; Mr. Thomas B. Rogers, Sullivan County; Mr. G. M. Dimmick, Chenango County.

The chapter adopted a constitution and by-laws.

* * *

Westchester County

We are indebted to Mr. Francis J. Laverty, Executive Secretary of the Westchester County Chapter for the following report:

"The May meeting of the Westchester County Chapter of the New York State Society of Professional Engineers, Inc., was held in the Court House, in White Plains, on the 2nd, and was presided over by John Avery, President. More than 100 engineers and associates were present.

The meeting was one of the most enthusiastic gatherings of engineers and associates which has been held by the Chapter. The principal speakers were Mr. James R. Rundell, chairman of the Organization Committee for the Architects and Engineers Employees Association, and Mr. Andrew M. Anderson, president of the Association.

The speakers outlined the steps leading up to the formation of the association, and the aims and activities of the new society. Many of the members present joined in the discussion which followed."

* * *

Bronx County

Mr. A. B. Green, a member of Kings County Chapter, was the guest of the Executive Board at its usual monthly dinner-meeting which was held prior to the Chapter meeting at the Concourse Plaza Hotel on May 5th. Mr. Green has played a remarkable part in the growth of his Chapter having personlly secured more than thirty applications from Engineers who have been elected to membership. His description of the methods he employs revealed that he has developed a very clever technique based on his discoveries that: members of organizations engaged in certain Engineering, or allied, activities are more likely prospects than others; men holding certain positions in organizations can be more readily interested than others; recitals of certain accomplishments and activities more quickly arrest attention and arouse interest than others; an astonishingly large number of Engineers are ignorant of the licensing law; a clear statement of those unique functions of the Society which differentiate it from other organizations is essential. His interesting and instructve statement to the Board suggested the thought that an address by Mr. Green to a gatherng of chairmen of Chapter Membership Committees would result in a material increase in the number of membership applications.

At the Chapter meeting Mr. Rudolph C. Lang was appointed Chairman of the Professional Conduct Committee. This committee was empowered (a) to investigate charges that the Works Division of the Department of Public Welfare has, and is, appointing and designating unlicensed men as "Engineers" and placing such men in positions where it is their duty to practice "Professional Engineering," and (b) if these charges are substantiated to take necessary steps to have such violations of the law discontinued or rectified.

Hon. James J. Lyons, President of the Borough of The Bronx, has entered into an agrement with the Tri-Borough Bridge Authority under the terms of which surveys, plans, estimates and specifications for the easterly approach (approximately 7 miles long) to the Tri-Borough Bridge will be prepared by the Engineering forces under the jurisdiction of the Borough President. This agreement has resulted in the reinstatement on a full-time basis of 45 members of the engineering force who have been on a part-time basis. Mr. Joseph F. Lamb, President of the Chapter, communicated with Borough President Lyons extending congratulations and expressing the gratification of the Chapter at his successful negotiation of the agreement.

* * *

Steuben Area

Mr. H. F. Eilers, Secretary of the Steuben Area Chapter, writing of the May meeting of the Chapter states: "We had a well attended meeting of the chapter in Hornell at which 21 members and 10 guests were present. Professor Paul Saunders of Alfred University gave an excellent and interesting demonstration and talk on "Liquid Air" which really was worthy of a much larger gathering.

Our next meeting will be held in Corning on Tuesday, August 7th, and will be combined with a "Clambake" and outing in company with the wives and sweethearts of the members."

* * *

Items of Interest

COURT UPHOLDS CITY SURVEYOR

(Continued from Page 12)

licensed under that statute. The ordinances do not, directly or indirectly, dispense with this requirement. Hence no one may act even as a city surveyor (unless within the exemptions prescribed by section 1457 of the Education Law) without being the holder of a state license.

Under the ordinances, however, the holder of a state license as land surveyor may not prepare and file a vault survey with the city unless, in addition, after having passed an examination by the city's examining board, he has been appointed a city surveyor and has duly qualified as such. Such a requirement is not unreasonable. Vault surveys are not intended merely for filing in the archives of the city but for use by it. The answer of the city, with its supporting affidavits, shows plainly that the peculiar topography of the city justifies the added protection afforded by its own examinations, which test the competency and fitness of applicants in respect to local conditions. The city should not therefore be denied the right it has exercised, undisturbed for centuries, to fix and examine into the qualifications of those who must prepare vault surveys for its own use so long as it does not attempt to abrogate the requirement of a state license.

While the ordinances deny to the petitioner the right to file vault surveys with the city, as he is not a city surveyor, they do not prevent him from engaging in the private practice of land surveying within the city. The ordinances and the Education Law when read together are not in conflict with each other. The ordinances are therefore valid.

The motion for a peremptory order of mandamus is denied.

METROPOLITAN REGIONAL COMMITTEES ON ENGINEERS' EMPLOYMENT AND SALARIES

Report on Classification of Engineering Positions and Salaries

The following report, prepared under the direction of D. B. Steinman, Regional Chairman, has been forwarded to the various collaborating societies.

The liberty of rearranging the order of the report has been taken by the Editor.

1. This report, covering classifications of engineering positions and salaries, is intended to apply to the New York Metropolitan Region, embracing the territory in the states of New York, New Jersey and Connecticut within a radius of 100 miles of New York City.

2. The designations indicated for the respective classificatons in the schedule are merely for convenience of reference, and have no significance in the application of the schedule.

3. In determining the calssification of any engineering positions by the schedule, the duties performed and not the designations applied shall govern.

4. The qualification requirements specified for the respective classifications are minimum. Higher qualifications shall not preclude acceptance of employment in a lower classification.

5. The salaries specified in the schedule are hereby established by the Metropolitan Regional Committee as the proper rates of compensation for engineering employees working in the respective classifications in the Metropolitan Region. Salaries below the range specified in the schedule for any classification shall be regarded as inadequate, sub-standard, and unfair.

6. The ranges of salaries specified for the respective classifications in the schedule are intended to provide leeway to cover differences in magnitude and importance of the work, in the efficiency and responsibility of the individual, and in his length of experience in the classification.

7. The ranges of salaries specified in the schedule have been determined as fairly representing the prevailing salaries for the respective classifications in the Metropolitan Region as of 1930. The salaries herein established are based on the salary surveys made by the Committee on Salaries of the Am. Soc. C. E. from 1930 to 1934, and on the statistical studies made by the Metropolitan Regional Committee's Subcommittee on Salary Statistics from 1933 to 1934.

Auspices:

This report has been prepared and officially sponsored by the Metropolitan Regional Committee on Engineers' Employment and Salaries, which consists of the following designated representatives of participating and engineering organizations:

American Society of Civil Engineers: Jas. F. Sanborn, J. P. H. Perry, L. G. Holleran, Arthur Richards, Allen P. Richmond.

American Society of Heating and Ventilating Engineers: John G. Eadie.

American Association of Engineers: James H. Griffin.

New York State Society of Professional Engineers: D. B. Steinman, Arnold G. Chapman.

New Jersey Association of Professional Engineers: O. H. Ammann.

Connecticut Conference of Professional Engineers: Willard S. Conlon.

New York Society of Structural Engineers: N. A. Richards.

New York Association of Consulting Engineers: John G. Eadie.

Metropolitan Section, Am. Soc. C. E.: V. T. Boughton, D. B. Steinman, W. W. Brush.

Am. Soc. Mechanical Engineers, N. Y. Section: George B. Pegram.

Am. Inst. Electrical Engineers, N. Y. Section: H. E. Farrer.

Municipal Engineers, City of New York: A. C. Forbes.

Association of Engineers of N. Y., Inc.: John C. Riedel.

N. Y. County Chapter, State Society of P. E.: J. W. Pickworth.

Kings County Chapter, State Society of P. E.: Frederick Ward.

Queens County Chapter, State Society of P. E.: J. Franklin Perrine.

Bronx County Chapter, State Society of P. E.: Arthur V. Sheridan.

Richmond County Chapter, State Society of P. E.: Fred H. Zurmuhlen.

Westchester County Chapter, State Society of P. E.: John Avery, E. H. Krey.

Brooklyn Engineers' Club: Louis G. Nieman.

N. Y. Chapter, Am. Asso. of Engineers: R. M. Boynton.

Federation of Architects, Engineers, Chemists and Technicians: J. J. Sternback, J. E. Kerchien, J. B. Diamond.

The Metropolitan Regional Committee held its organization meeting November 9, 1933, and proceeded to function through its officers and sub-committees as named below. The results of its studies are embodied in this report.

Executive Committee:

V. T. Boughton, Chairman; John C. Riedel, J. W. Pickworth, John G. Eadie, Allen P. Richmond.

Committee on Salary Statistics:

Arthur Richards, Chairman; George B. Pegram, Fred H. Zurmuhlen, J. B. Diamond.

Committee on Classification of Grades:

James H. Griffin, Chairman; Arnold G. Chapman, Willard S. Conlon, Frederick Ward, George L. Freeman, J. E. Kerchien, E. H. Krey.

Committee on Salaries for Professional Engineers:

Arthur V. Sheridan, Chairman; R. M. Boynton, H. E. Farrer, John Avery, N. A. Richards.

Committee on Salaries for Engineering Assistants:

J. F. Perrine, Chairman; O. H. Ammann, A. C. Forbes, J. J. Sternbach, L. G. Nieman.

GRADE 1.—ENGINEERING ASSISTANT

Duties: Under immediate supervision, to assist on engineering work in field or office; make simple measurements and sketches; make and check simple computations; make tracings and simple drawings from sketches and record plans; do neat lettering of various forms; assist in the compilation of engineering data; assemble and file engineering plans, specifications, and records; perform the usual work of a Rodman, Chainman, Tracer, and Junior Draftsman.

Requirements: Education equivalent to graduation from a high school.

Salary: $30 to $50 per week.

GRADE 2.—JUNIOR ENGINEER

Duties: Under supervision, to perform technical work in the office or field requiring a knowledge of engineering practices and methods; make working drawings and designs and prepare estimates; make computations of a technical character; perform minor surveys and construction inspection. This classification includes the position usually called Levelman, and the lower grades of Draftsman and Inspector.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing, plus about one year of experience on engineering work; thorough knowledge of care, operation and adjustment of engineering instruments; ability to design simple engineering structures.

Salary: $40 to $60 per week.

GRADE 3.—JUNIOR ASSISTANT ENGINEER

Duties: Under supervision, to take charge of a field party, a drafting squad, or inspection of construction; to make and check quantity and cost estimates; to lay out work and draw plans and detail drawings; to check working drawings and fabricator's details; to keep records; to make reports. This classification includes the higher grades of Draftsman and the positions usually called Transitman, Engineering Inspector, Detailer, Checker, Squad Boss and Chief of Party.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing plus about three years of experience in engineering work; ability to exercise engineering judgment and skill; ability to plan operations in office or field.

Salary: $50 to $75 per week.

GRADE 4.—ASSISTANT ENGINEER

Duties: To perform important engineering work in office or field requiring the exercise of independent engineering judgment and skill; to make studies, estimates, and reports; to prepare designs and specifications; to supervise the work of draftsmen, or of field parties or a group of inspectors on construction work. This classification includes the positions usually designated as Designer or Designing Engineer.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing plus about five years of experience in engineering work of which at least one year shall have been in responsible charge; and possession of a li-

cense as a Professional Engineer.
Salary: $75 to $100 per week.

GRADE 5.—ENGINEER

Duties: To be in responsible charge of a minor engineering organization or to have immediate administrative and technical charge of a division (comprising several squads or parties in office or field) in a large organization; to plan, direct and supervise the design or construction of engineering projects; to supervise the preparation of contracts and specifications and to be entirely responsible for the engineering, construction and business operations of his division, bureau, section, or department; to have immediate responsible supervision of the work of draftsmen, designers, and assistant engineers. This classification also includes the positions usually designated as Resident Engineer and Section Engineer.

Requirements: A first-class technical education plus about eight years of professional experience in the active practice of engineering; ability to plan, design, and supervise engineering works; and possession of a license as a Professional Engineer.

Salarys: $100 to $150 per week.

GRADE 6.—ASSISTANT CHIEF ENGINEER

Duties: To be in responsible professional and executive charge of a major division of work on a large engineering project, involving planning, designing, and supervision of construction; to give independent, critical engineering advice for executive action incidental to such work; to assume professional and executive responsibility for the whole of a smaller engineering project. This classification also includes the positions usually designated as Division Engineer and Senior Engineer.

Requirements: A first-class technical education supplemented by cultural and economic studies, plus about twelve years of broad professional experience embracing a thorough knowledge of engineering office methods, field work, design, construction, and business administration; and possession of a license as a Professional Engineer.

Salary: $150 to $200 per week.

GRADE 7.—CHIEF ENGINEER

Duties: To have entire charge and be responsible for entire organizations comprising more than one engineering division and engaged in more than one class of work; to determine and establish technical and administrative policies and procedures; to be responsible for all engineering design, construction, and business operations; and to investigate all engineering projects submitted for consideration and report critically regarding feasibility, cost, economic justification, and public necessity or convenience.

Requirements: A first-class technical education, supplemented by cultural, economic and social studies, plus about fifteen years of broad professional experience embracing a thorough knowledge of engineering office methods, field work, planning, design, construction, maintenance, operation, engineering economics, contract law, and business administration; recognized standing in the engineering profession, and possession of a license as a Professional Engineer.

Salary: $200 to $500 per week.

NEW ROCHELLE SHOWS WAY

Merger of City Engineers' Job and D. P. W. Post Urged

Charter Amendment Also Required
Incumbent to be Registered and Licensed Professional Man to be presented by Brower

An amendment to the City Charter, calling for the consolidation of the positions of Director of Public Works and City Engineer, is expected to come up before City Council when it meets in special session on Monday.

City Manager Irving C. Brower, said today he will urge merging of the two offices. The merger was suggested at a meeting of the City Council this week by Councilman Stanley W. Church and others.

The suggested amendment, to be drafted by Corporation Counsel Aaron Simmons, will make it mandatory the Director of Public Works be licensed by the State of New York as a professional engineer.

Although the position of City Engineer was created under the Charter, the office has never been filled. It has freequently been the bone of contention, politically and otherwise.

In suggesting a change in the Director's qualifications, City Manager Brower pointed out that 85 per cent of the department's work involves engineering.

The present Director of Public Works, Bert J. Young, is a duly licensed engineer and would qualify under the proposed amendment. Mr. Young was granted his license February 25, 1924.

LICENSES GRANTED

April and May, 1934

APRIL

*Boeckmann, Henry H. Centerport, N. Y.
Burkin, John F. Greenwich, N. Y.
Carleton, Robert A. W. New York, N. Y.
Clutter, Ernest E. New York, N. Y.
DeLuze, Louis P. New Rochelle, N. Y.
Firth, Elmer W. Jamaica, L. I.
*Fitzpatrick, John F. Rochester, N. Y.
Fleming, Paul B. Cleveland, Ohio
Griffin, Harry L. Rockville Centre, L. I.
*Gyves, John J. Brooklyn, N. Y.
Hirsch, Leo J. Brooklyn, N. Y.
Hale, Harry W. Mechanicville, N. Y.
Hamilton, Robert F. Garden City, L. I.
Harris, Harry E. Bridgeport, Conn.
Hoffberg, Israel New York, N. Y.
Ingersoll, Crandler D. Tuckahoe, N. Y.
Johnson, Sydney K. Norwich, N. Y.
Johnston, Alexander L. New York, N. Y.
Karp, Edmund I. Brooklyn, N. Y.
*Kochenhauer, Rudolph F. Bronx, N. Y.
Korein, Isidor Brooklyn, N. Y.
McIntosh, Cromwell Kenmore, N. Y.
Mayhew, B. Alan L. I. City, N. Y.
Mentzel, Charles New York, N. Y.
Miller, James E. New York, N. Y.
Mosher, Max Larchmont, N. Y.
Orzel, Paul New York, N. Y.
*Papillo, Joseph B. Rochester, N. Y.
Petrofesi, Michael F. New York, N. Y.
Porter, Henry G. Yonkers, N. Y.
Powell, Alvin L. Glen Ridge, N. J.
*Schmidt, John W. Ellenville, N. Y.
Seidman, Solomon H. Brooklyn, N. Y.
Sloat, Benjamin C. New York, N. Y.
Stranahan, Wm. P. Buffalo, N. Y.
*Sutermeister, Carl A. Jackson Hgts., N. Y.
Swenson, Otto J. Troy, N. Y.
Taylor, Stanley Troy, N. Y.
Trowbridge, Chas. E. New York, N. Y.
Vincent, Everett M. Goshen, N. Y.
Waugh, Lester R. New York, N. Y.
Winton, Lewis B. Greenwich, Conn.
Zentner, Arthur A. New York, N. Y.

MAY

Allen, Herschel H. Baltimore, Md.
Anderson, Aksel P. Forest Hills, L. I.
Andrews, W. Earle New York, N. Y.
*Ballance, John A. Port Washington, L. I.
Billsboroow, Ralph E. Paterson, N. J.
Carroll, Francis H. Rochester, N. Y.
*Chaskin, Harold S. New York, N. Y.
Collet, Walter J. Scarsdale, N. Y.
Curtin, James H. New York, N. Y.
*Dunlop, John A. Troy, N. Y.
*Farmer, Daniel Newburgh, N. Y.
Firth, Robert W. Brooklyn, N. Y.
Fuleihan, Nasri S. New York, N. Y.
Furbank, Arthur W. Brooklyn, N. Y.
Grossbard, Sol New York, N. Y.
Hanckel, Robert C. Scotia, N. Y.
*Haynes, George E. Rensselaer, N. Y.
*Hebach, Fred A. Yonkers, N. Y.
Hettler, Wm. M. Niagara Falls, N. Y.
Kane, Daniel C. Brooklyn, N. Y.
Khmel, Vsevolod K. New York, N. Y.
Kneas, Frank N. Philadelphia, Pa.
Knochenhauer, R. F. Bronx, N. Y.
*Krause, Nathan Schenectady, N. Y.
Lee, Maynard D. Rochester, N. Y.
Linsky, Abraham J. Brooklyn, N. Y.
*Marks, Claude U. Middletown, N. Y.
Marx, George Mt. Vernon, N. Y.
*Matthews, Joseph G., Jr. Hollis, L. I.
Messenger, Wm. H. Brooklyn, N. Y.
*Perkins, Bernard R. Schenectady, N. Y.
Pierce, James H. Scranton, Pa.
*Pronin, Joseph Brooklyn, N. Y.
*Roach, Bernard V. Poughkeepsie, N. Y.
Rubenstein, Louis J. Brooklyn, N. Y.
Sadler, Dudley K. Mt. Vernon, N. Y.
Schoening, Frederick C. New York, N. Y.
Seyfang, Wm. G. Buffalo, N. Y.
Sharp, Herbert M. Buffalo, N. Y.
Sos, Ferdinand Bronx, N. Y.
Weiss, Edmond New York, N. Y.
Whitney, Chas. A. Freeport, L. I.

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THE REPORTS THAT CAME IN

WHEN THE FROST WENT OUT

★ **It was news from the Hudson to Niagara, as spring showed the terrific damage that winter had done to New York's roads.**

But not all roads—for the concrete roads stood up—just as they stood up in every major test for twenty years.

Let's see what New York papers say:

★ THE BINGHAMTON PRESS
"A MONUMENT OR RUIN"

"It isn't often that ruins constitute a monument to a contemporaneous public servant, yet it is to be observed that the (———) highways of New York state this spring are tragic reminders of what might have happened to the vastly expensive New York state highway system except for the foresight and determination of Colonel Frederick Stuart Greene, state superintendent of public works . . .

"Of course, he was opposed . . . But he made his point, had his way and demonstrated the worth of concrete early enough to save the New York state taxpayers millions and millions of dollars in too-frequent replacement of mileage . . ."

Editorial—April 16, 1934

★ ROCHESTER, N. Y., TIMES-UNION
"Old Man Winter played havoc with highways in portions of the Rochester area and in many sections of the state, but he was kind to the roads constructed by Monroe County, the most of which are in good condition.

"Winter's damage to state highways in the six counties under the jurisdiction of Howard E. Smith, district engineer for State Highway Department, was more serious than at any time during the past few years.

" 'Winter did more damage to the (———) roads than at any time during the last few years,' he said. 'The concrete highways were not seriously damaged'."

News Story—April 20, 1934

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